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MEMOIRS OF THE QUEENSLAND MUSEUM

VOL. VII.

WITH NINETEEN PLATES AND SEVENTY-TWO TEXT-FIGURES.

EDITED BY THE DIRECTOR,

HEBER A. LONGMAN, F.L.S.

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EDIBLE FISHES OF QUEENSLAND.

BY J. DOUGLAS OGILBY (ICHTHYOLOGIST).

PART XV.—SERRANIDÆ (No. 1).

(Plates I to III.)

Percolates Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales, xii, 1887, p. 182; Ogilby, Edib. Fish N. S. Wales, 1893, p. 2; Boulenger, Catal. Percif. Fish., 1895, p. 132. Type—*Lates colonorum* Günther 1863.

Body subovate and compressed. Scales moderate, adherent, concentrically striated, more or less strongly ciliated, those of the throat and breast small. Lateral line complete, continued on the base of the caudal fin, the tube simple and straight, not extending to the border of the scale. Head large and partly naked, the upper profile variable. Mouth terminal and protractile, with wide oblique cleft, the lower jaw more or less projecting, the maxillary large and dilated, exposed, with well developed supramaxillary. Teeth in villiform bands, on the jaws, vomer, and palatines; tongue toothless. Nostrils of moderate size, approximate, opening in front of the middle of the eye, and much nearer to it than to the edge of the preorbital, the anterior valvular. Preorbital, suborbital, and vertical border of preopercle serrated; angle and lower border of preopercle armed with strong teeth, which on the latter may be antrorse; opercle with two divergent spines, the lower much the longer; postclavicle and posttemporal usually serrated. Two dorsal fins, connected at the base, the first with viii, rarely ix, strong pungent spines, the interspinous membrane deeply cleft; second dorsal shorter than the first, with i 8 to 11 rays, the base concealed by a low scaly sheath. Caudal emarginate, with 17 principal rays. Anal short, with iii 7 to 9 rays, extending well beyond and similar to the second dorsal. Pectoral obtusely pointed, with 12 to 16 rays, the upper middle ones the longest. Ventral longer than the pectoral with i 5 rays, inserted a little behind the pectoral-base. Gill-openings wide; gill-membranes separate, free from the isthmus; six branchiostegals; pseudobranchiæ present; gills four, a slit behind the fourth; gill-rakers stout and well developed, in moderate number; pharyngeal bones large, densely covered with small teeth. Air-bladder present, large. Stomach caecal, intestinal canal convoluted, pyloric appendages in moderate number. Posterior processes of the premaxillaries not extending to the frontals; parietal and supraoccipital bones not extending to between the postfrontal processes; supraoccipital crest strong, not produced on the frontals. Vertebrae $11 + 14 = 25$.

Monotypic. The single species inhabiting the fresh waters and estuaries of Southern and Eastern Australia, from the Gulf of Saint Vincent, S.A., to the Pine River, S.Q.

Notes.—Boulenger describes and McCoy figures the scales of this fish as being "cycloid." Of the numbers which I have examined I have never seen one to which this description could be correctly applied; the strength of the ciliation is, however, extremely variable, and some specimens only show it weakly along the middle of the side, where about half a dozen small teeth are alone present on the middle of the outer edge of the scale, leaving a broad dorsal and abdominal cycloid band. Normally, however, the scales of the estuarine forms show distinct ciliation, except those of the nape and a narrow, gradually contracting band below the base of the spinous dorsal, where they are constantly cycloid. And this variation in the scale-character of those examples which more or less permanently reside in the brackish water of an estuary, leads naturally on to the much coarser ciliation of the scales of those individuals which have taken on a more or less purely fluviatile existence. This character, therefore, is manifestly of no value as a specific factor. With regard to the emargination of the upper profile of the head, on which Stead lays so much stress, I find that this is wholly caused by the usually more marked convexity of the snout in the estuarine form, which necessarily induces a hollow between the snout and the occipitonuchal convexity. As, however, I have examined several of these fishes in which, through the straightening of the snout-contour, the emargination was practically eliminated, it will be understood that I can not see my way to accepting this character as of specific value, the difference being in my opinion more apparent than real.

PERCALATES COLONORUM (Günther).

- Lates colonorum* Günther, Ann. & Mag. Nat. Hist. (3) xi, 1863, p. 114; Castelnau, Proc. Zool. & Accl. Soc. Vic., i, 1872, p. 43; McCoy, Prodr. Zool. Vic., dec. ii, 1878, pl. xiv; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 304; Tenison-Woods, Fish & Fisher. N. S. Wales, 1882, p. 31, pl. i; Johnston, Proc. Roy. Soc. Tas., 1882, p. 59; O'Connor, Proc. Roy. Soc. Queensl., xii, 1897, p. 110; Zietz, Trans. Roy. Soc. S. Austr., xxvi, 1902, p. 265.
- Dules novemaculeatus* Steindachner, Sitz. Akad. Wien, liii, 1886, i, p. 428, pl. i, fig. 2; id., ibid., lx, 1869, i, p. 674; Klunzinger, Arch. f. Nat., xxxviii, 1872, i, p. 20.
- Dules reinhardtii* Steindachner, ibid., lvi, 1867, i, p. 320.¹
- Lates similis* Castelnau, ibid., p. 44; Macleay, ibid., p. 305.
- Lates antarcticus* Castelnau, ibid.; Macleay, ibid.
- Lates victoriae* Castelnau, ibid., p. 45; Macleay, ibid.
- Lates curtus* Castelnau, Res. Fish. Austr., 1875, p. 5; Macleay, ibid., p. 306.
- Lates ramsayi* Macleay, ibid.
- Percalates colonorum* Ogilby, Edib. Fish. N. S. Wales, 1893, p. 2, pl. i; Boulenger, Catal. Percif. Fish., 1895, p. 132; Stead, Fish. Austr., 1906, p. 96; id., Edib. Fish. N. S. Wales, 1908, p. 53, pl. xxii, low. fig.; id., Proc. Linn. Soc. N. S. Wales, xxxv, 1910, p. 659; Roughley, Fish. Austr., 1916, p. 60.
- Percalates fluviatilis* Stead, Proc. Linn. Soc. N. S. Wales, xxxi, 1906, p. 261; id., Edib. Fish. N. S. Wales, 1908, p. 54, pl. xxii, upp. fig.; McCulloch, Proc. Linn. Soc. N. S. Wales, xxxv, 1910, p. 432; Stead, Proc. Linn. Soc. N. S. Wales, xxxv, 1910, p. 658.

¹ Boulenger, I believe erroneously, quotes this form as *Dules reinwardti*; I follow Günther (Zool. Rec., iv, 1867, p. 159). McCulloch, in answer to a query, kindly writes—"According to my slip, copied from the original reference, the name is *Dules Reinhardtii*."

BASS.

Australian Bass; Perch; Estuary Perch; Fresh-water Perch.

Type localities:—Victoria (*L. colonorum*).
 Neighborhood of Sydney (*D. novemaculeatus*).
 Port Jackson (*D. reinhardtii*).
 Gippsland Lakes (*L. similis*).
 Melbourne Market (*L. antarcticus*).
 Melbourne Market (*L. victoriae*).
 Richmond River, N.S.W. (*L. curtus*).
 Waterhole at Parramatta, N.S.W. (*L. ramsayi*).
 Rivers of New South Wales (*P. fluviatilis*).

Dorsal contour of body rather more arched than that of the ventral, its width at the shoulder 1.9 to 2.5 in its depth immediately in front of the ventral fins, which is 2.4 to 3 in its length and equal to or a little more than the length of the head. Caudal peduncle stout, its depth 1.37 to 1.6 in its length behind the soft dorsal and 2.4 to 2.67 in the length of the head. Head from two fifths to four fifths deeper than wide, the upper profile varying from linear in fluviatile examples to emarginate in those which remain permanently in estuarine waters, the difference being solely caused by the shape of the snout, the contour of which is more or less rounded in the latter form, thus making with the occipito-nasal convexity an intervening fictitious emargination; depth of head 1.38 to 1.5 in its length, which is 2.55 to 3.25 in that of the body. Snout pointed, its length 3.75 to 4.17 in that of the head. Diameter of eye from one fourth more to one fifth less than the length of the snout and 3.33 to 4.75 in that of the head; preorbital narrow; interorbital region wide and moderately convex, its width equal to one half less than the eye-diameter. Maxillary extending to below or a little beyond the middle of the eye, its length 2.33 to 2.7 in that of the head, the width of its truncate distal extremity 1.33 to 3 in the eye-diameter. Preorbital and suborbital finely and evenly serrated, the edge of the former undulous or emarginate; hinder limb of preopercle linear and subvertical, armed with fine serræ which gradually decrease in size from below and are absent or vestigial on the upper part of the limb; angle and lower limb with a series of strong, more or less curved spines, which are sometimes broken up distally into two or more points and, on the latter may be arranged in groups, each individual spine having a more or less antrorse direction; lower opercular spine two thirds to three fifths of the eye-diameter.

Premaxillary bands of teeth broader than those of the mandible, each separated by a symphysial hiatus, and each diminishing to a blunt point behind; vomerine teeth in an arcuate band, of equal width throughout, as also is the palatine band.

Scales of body more strongly ctenoid in the fluviatile than in the estuarine form, arranged in 48 to 55 series above the lateral line, in 7 to 9/1/16 to 19 between the fifth dorsal spine and the vent. Scales of nape, a strip along the base of the spinous dorsal, throat, and head cycloid. Opercles, postorbital, and

parietal regions, and cheeks scaly, the rest of the head naked; cheek-scales much smaller than the others, in 8 or 9 series between the eye and the angle of the preopercle. Lateral line following the curvature of the back.

Dorsal fins with viii or ix, i 8 to 11 rays, originating slightly behind the pectoral-base, and terminating above the fifth or sixth anal ray; first spine short, 4.2 to 4.75 in the longest, which is usually the fourth, though the fifth sometimes slightly exceeds it, and is 1.67 to 2.67 in the length of the head, the last as long as or a little longer than the second, 1.9 to 2.2 in the longest, and 1.22 to 1.4 in the spine of the second dorsal, which is 1.4 to 1.67 in the longest ray; first, second, or third ray longest, one sixth more to one sixth less than the longest spine, and subequal to the basal length of the second dorsal, which is 1.17 to 1.33 in that of the first; first dorsal ray divided distally, the last split to the base; outer border of soft rays gently rounded. Caudal fin emarginate, with 17 principal rays, the lobes equal and obtusely pointed, the middle rays 1.38 to 1.67 in the upper lobe, which is 3.55 to 3.83 in the body-length. Anal fin with iii 7 to 9 rays, originating below the third or fourth dorsal ray; second and third spines equal or the third a little the longest, intermediate in length to the sixth and seventh dorsal spines, 2.44 to 3.67 in the length of the head, and 1.33 to 1.5 in the first or second ray, which is one tenth to one fourth more than the basal length and 1.8 to 2.2 in the length of the head; outer border linear; rays similar to those of the dorsal. Pectoral obtusely pointed, with 12 to 16 rays, its length 1.55 to 2 in that of the head; fourth or fifth ray longest, extending to below the sixth or seventh dorsal spine. Ventral bluntly pointed, the spine strong and pungent, 1.37 to 1.67 in the length of the first and second rays, which are subequal, 1.44 to 1.7 in the length of the head, and do not usually reach the vent.

Gill-openings extending forward to below the middle of the eye; gill-rakers longer than the gill-fringes, 13 to 16 on the lower branch of the anterior arch, the longest 1.3 to 2.67 in the eye-diameter; pyloric appendages 10.

Upper surface varying from olive-brown to deep olive-green, the head darkest; sides and lower surfaces shading from grayish green to grayish white, the latter and the cheeks sometimes washed with yellow. All the fins olive-green, except the first dorsal, which is gray or lavender; upper half of opercle, ventrals, and anal with a conspicuous blackish blotch in the young.

Described from numerous examples, measuring from 143 to 878 mm., collected at various localities between and including the Snowy River, N.S.W., and the Pine River, Q.

My "Edible Fishes and Crustaceans of New South Wales" being now unattainable, I think it advisable to republish my reasons for rejecting the supposititious species of Castelnau and Macleay, so as to make this article as complete as possible; and at the same time to bring my account of the species up to date by going thoroughly into the claims of *Percalates fluviatilis* to validity. In the work quoted I remark:—

“A few words are necessary here with regard to the forms of the Australian Perch described as new by Castelnau and Macleay, the types of all of which are missing. In 1872 the former created three new species to which he gave the names *Lates similis*, *L. antarcticus*, and *L. victoriae*. To these, between the above date and 1881, he added a fourth species, *L. curtus*, from the Richmond River. In 1876, Alleyne and Macleay described, under the name *Pseudolates cavifrons*, a North Australian fish, and in the following year the latter author redescribed the same species as *Lates darwinicnsis*; these two names may be at once dismissed from consideration as being mere synonyms of the widely distributed *L. calcarifer*, as an examination of the type specimens at once reveals. Finally in 1881 Macleay described a *Lates ramsayi* from a single specimen taken in a freshwater pool near Parramatta, the type of which is also missing. We have, therefore, in the restricted genus *Percalates*, no less than five spurious species, excluding the original *P. colonorum*, all described from a similar and somewhat limited area, on what appear to be insufficient grounds. That none of the later writers on Australian fishes (Johnston, Catalogue of Tasmanian Fishes, 1882, McCoy, loc. cit., 1878, and Lucas, Census of Victorian Fishes, 1889) except the author (Catalogue of New South Wales Fishes, 1885), venture an opinion on their specific identity or otherwise, is, it must be conceded, a most unsatisfactory state of affairs, and merits, therefore, a more extended inquiry than is usually necessary in such cases.”

To these must now be added *Percalates fluviatilis* Stead, the claims of which have been so strenuously put forward by its author. With this form I shall deal on a future page. Of Steindachner's two species, both from Port Jackson or its immediate neighbourhood, I am unable to say anything from personal knowledge, not being in a position to consult his descriptions or figure, but there can be no doubt as to their identity with one or other of the forms of *P. colonorum*. Of the first, *Dules novemaculeatus*, indeed, McCulloch writes as follows:—“It appears to me that Steindachner's figure of *Dules novemaculeatus* exactly represents the slender form; and, beyond such differences as would be caused by shrinkage due to different methods of preservation (alcohol Steindachner and formalin Stead), it does not differ from Mr. Stead's figure published in the Edible Fishes of New South Wales.”

My original remarks regarding Castelnau's four species are:—

“In *L. similis* the characters relied on for its separation from the type species are absurdly inadequate; these are the shorter snout, which is ‘sensibly less than the diameter of the eye’; with the majority of fishes the comparative size of the eye to the head and to the snout varies with the age of the individual, the young fish having that organ much larger proportionately than the adult. As I have shown above the great variation existing between the comparative measurements of the eye and the snout in twenty five specimens of indubitable *P. colonorum*, ranging from Adelaide to the Richmond River, it is manifest that the stress laid upon this character is altogether misleading, and must be regarded as valueless. The coarser denticulations of the preopercle are also a sign of

immaturity, and as such unreliable. In the large series which has passed through my hands specimens have in rare instances occurred in which the teeth of the lower preopercular limb were directed absolutely downwards; neither this character nor that of the omission of one of the dorsal rays can, therefore, be taken as a valid reason for separating *L. similis* from Günther's well known species."

As regards the length of the snout this is, in Mr. Stead's selected specimen of *P. fluviatilis*, measuring 145 mm., one fourth less than the eye diameter, and even in the 275 mm. example forwarded by the New South Wales Fisheries Department, the two are of equal length, while in the former the preopercular dentition is everywhere exceptionally strong, and in the latter there are but nine soft dorsal rays, so that in these two picked specimens all the characters of *L. similis* are present. It is worth noting that in Castelnau's five descriptions of *Lates* not once does he mention the shape of the head; it is, therefore, presumable that he attached no weight to this character.

Of *Lates antarcticus* Castelnau I wrote:—

"It is unnecessary to go at any length into the question of the validity of *L. antarcticus*, since, with two exceptions, a comparison of Castelnau's description with that given above, will show that no characters are put forward, which are not equally common to *P. colonorum*. These are the increased number of branchiostegal rays, which is stated to be seven in this species as against six, which the examination of numerous specimens has shown to be the normal number in *P. colonorum* as here and elsewhere stated, and also recorded by Prof. McCoy. I do not, however, attach any importance to this seeming discrepancy, since it is possible that the number is merely copied from the generic description of *Lates* given by Günther and which is correct of that genus,² as restricted to the two species *L. niloticus* and *L. calcarifer*. It may be further pointed out that in few, if any, of his descriptions of new genera and species does Castelnau take notice of this important character. The second exception, namely the coloration, is not of sufficient importance to justify the retention of *L. antarcticus* as a distinct form, and this name also must, therefore, sink into a synonym of the typical species. Further on (*see* p. 7) I shall have occasion to refer to a form which, by a casual observer, would be set down as distinct, but which, scientifically examined, is easily seen to be no more than a local variety of the common Australian Perch due to the greatly changed conditions under which it exists. This form may possibly be the *L. antarcticus* of Castelnau, though, if so, it is difficult to say why he should especially designate it the 'Sea Perch.'

"Of *L. victoriae* it is needless to say more than that no rational person is likely to believe that the substitution of a four pointed for a single pointed spine on the opercle is of itself sufficient to constitute a species.

"In Castelnau's last form *L. curtus* it is only necessary to point out that no reliance can be placed on the depth of the type specimen as indicative of even

² Brit. Mus. Catal. Fish., i, 1859, p. 67.

a variety. The proportion of depth to length is given by him as 1 to 3.33, but examples from Port Stephens, Shoalhaven, Shellharbor, and Ulladulla, examined by the writer in preparation of this article, ranged between 1 to 2.75 and 1 to 3.5. This character, therefore, having proved invalid, and there being no other on which to rely, it follows that *L. curtus* should be merged in *P. colonorum*.''

I find all the alleged differential characters attributed to these three latter species—*L. antarcticus*, *L. victoriæ*, and *L. curtus*—reproduced in one or other of the four examples forwarded to me from New South Wales, thus further proving their worthlessness, if that were necessary.

Nothing now remains but to consider the claims of Macleay's *Lates ramsayi*, and a very cursory glance at the description suffices to show that no mandate to specific recognition can be with justice urged on its behalf. Stress seems to have been laid by its author on the fact of this, to him, unique example having been provided with ten dorsal spines and seven anal rays; variations such as these are, as has been shown above, by no means so uncommon as is generally supposed, though the coincidence of their occurrence in the same individual is no doubt much more rare. In no other character does Macleay's diagnosis differ from that of individual specimens of our common Perch, and it, therefore, with the preceding four, must be relegated to the list of useless synonyms. The fact of its having been taken in a land-locked waterhole³ doubtless had some effect on its external appearance and thus helped to deceive its describer.

“Mention was made above of a variety of the common Perch which differed greatly in outward appearance from the ordinary fish. So far these fishes have only been sent to the Australian Museum from the pools in the Snowy River immediately below the Falls, but without doubt other rivers, both of New South Wales and Victoria, will, now that notice is drawn to the form, be found to have evolved under similar circumstances a similar variety. The differences between it and the common market fish, which present themselves at a casual glance, are the much more elongate habit, the proportionally longer and more powerful fins, and, though this is a much less important characteristic, the brilliant silvery color of this variety. A moment's thought, however, will suggest that these differences, however important they may at first sight appear, are only to be expected in fishes living under conditions, which differ so greatly from those under which the species normally exists; for, being practically forced to inhabit rapidly running waters, subject to sudden, severe, and periodical floods, caused for the most part by the melting of the snow on Kosciusko and the neighboring ranges, it is patent that their changed surroundings and conditions of life would induce a change in the direction indicated.

“To Mr. A. M. N. Rose of Campbelltown I am indebted for the knowledge of this well marked form, that gentleman having forwarded to the Australian Museum at my request two specimens, the first taken at Christmas the second late

³ Not in the Parramatta River as stated by Macleay (6).

in the autumn. Neither of these fishes showed the slightest traces of spawning though, if they breed in the river, it is incredible that the season selected for the deposition of its ova by a fish notoriously fond of warm sheltered spots, should be other than one of the two seasons during which my informant forwarded them. Mr. Rose, however, is of opinion that these fishes do not breed, at least not in the river, and he bases his opinion on the facts, certified to me by him, and through him to me by other residents of the district, that the examples caught vary but little in size, the usual length being from fourteen to eighteen inches, that no young fish have ever been observed, that no matter at what season of the year they are captured no milt or roe has ever been found in the ovaries, that they are always in fine condition, and finally that they infinitely excel the estuary Perch in flavor.

"The obvious inference is that certain individuals having made their way into the Snowy River at its entrance into the ocean gradually work upwards and eventually find themselves in the pool below the Falls, and being unable to proceed, remain there until captured or swept downward by flood to the estuary again; these latter having, since their enforced return into calmer and warmer waters, grown sybaritic and fat, may possibly be Castelnau's 'not very common' *L. antarcticus*, which he describes as 'silvery' and 'very savory.'"

The sterility of those fishes, which remain permanently in the pools below the Falls, would be satisfactorily accounted for by the coldness of the water.

Having now cleared the way I shall proceed to discuss the status of the latest claimant to specific honors, Mr. Stead's *Percalates fluviatilis*.

Stead (4) insists on

(a). "*The far more elongate habit.*"

(3) In the four New South Wales examples on which these remarks are wholly based the extreme variation in the depth of the body to its length is 2.44 to 2.87. This is by no means excessive and shows incontestably on how slender a foundation this character rests. In any case the somewhat more slender habit of the fluviatile form and its rather longer and stronger caudal peduncle may clearly be accounted for by the fish's permanent occupation of swiftly running water, as compared with the more equable ebb and flow of the estuarine tideways which *P. colonorum* mostly affects.

(b). "*The non-excavate character of the upper profile of the head, which in P. colonorum is universally concave—often highly so.*"

This contention has been dealt with above (see p. 2). It is interesting, nevertheless, to point out that in Boulenger's description of the species, he, with six specimens before him drawn almost assuredly from estuarine sources, writes "upper profile of head *sometimes concave.*" The italics are mine.

(c). "*The relatively greater thickness as compared with the body-length.*"

This is a character of minor importance. The forces contributory to the formation of a more slender type of fish (see "a") are also doubtless at work

here to bring about in other directions a habit of body more suitable to the changed conditions under which it now exists. For instance in swiftly flowing mountain torrents a fish with a cylindrical body would offer much less resistance to the current than would one of a deeper and more compressed form, and complies with the primary law which enacts that every natural object shall develop along the line of least resistance; it is probable that, as in this case, a species, the environment of which had been changed from that of a quiet and comparatively sluggish existence to one of continued and strenuous exertion, should tend to assume a shallower and broader habit as the years roll by.

(d). "*The shorter head.*"

In my four specimens the comparative measurements of the length of the head to that of the body are for *P. fluviatilis* 2.62 to 2.88, for *P. colonorum* 2.55 to 2.67. Since, therefore, they are seen to overlap in so small a series, it is evident that little or no reliance can be placed on this character as evidence of specific differentiation.

(e). "*The much more ctenoid character of certain body-scales in all but older specimens.*"

This claim has also been dealt with above (see p. 2).

Stead also pointed out that the two forms differed in their habits, but surely that was inevitable in view of their vastly altered conditions of life, and should carry no weight with it.

The only other differential character mentioned by Stead (5) is set forth in the following terms:—"The tail too is larger and altogether more powerful than that of the Estuary Perch." With this contention I have dealt under (a).

In conclusion I assert emphatically that from this re-examination I see nothing to cause me to change my previously expressed opinion, that all the various forms of this fish should be united under the original name—*colonorum*. There is absolutely no structural character by which *P. fluviatilis* can be separated from the parent stock while on the other hand every conceivable shade of variation exists, uniting the two forms. *P. fluviatilis* is doubtless identical with the fish alluded to by me (loc. cit. p. 7) as having been sent to the Australian Museum at my request by Mr. Rose from below the Falls of the Snowy River, and rejected by me as not even worthy of varietal rank.

None of the authors, who have so overloaded this species with useless synonyms, seem to have taken into account that owing to diversity of environment; climatic conditions, due not only to their geographical range, but also to the varied altitude at which they may reside; the character of their native streams, whether sluggish and discolored with a muddy or weedy bottom, or clear and sparkling as it flows over a bed of rock and gravel and sand; the nature of the geographical strata over which the stream flows; the great diversity of the food supply; and many other fortuitous circumstances, much greater latitude of variation should be allowed to fluviatile fishes than to their more equably situated

marine relatives. And the variation is apt to be greatly accentuated when the particular fish under review leads, as in this case, both a fresh-water and a brack-water existence.

Reproduction.—During the late autumn and early winter months the Bass drop gradually down, from the upper reaches of the rivers and the quiet billabongs, where they make their home during the greater part of the year, to the estuaries, and finally to the purer waters of the open bay off the mouths of their home streams. Here they shed their spawn during June, July, and August, the season being proportionally later the further we proceed north. The ova are pelagic, and the fry, such as escape their numerous enemies, quickly work their way up stream to seek the safer sanctuary of still lagoon and billabong.

Uses, etc..—The Royal Commission on the Fisheries of New South Wales (1880) reported of this species—"It is a very delicious fish, but never attains a great size and is perhaps of more value for the sport it affords to the amateur fisherman than as an article of food." While, in the light of our present-day knowledge, much of this estimate of the Bass' value is liable to provoke a smile, Tenison Woods, from whose work the above quotation is taken, gives as interesting an account of its habits and qualities as a sporting fish as any of his successors—or more so. He writes—"The perch affords good sport to anglers. It loves quiet, shady, and deep holes in the rivers, but when the tide is flowing it may be caught in the stream. It is very voracious. In winter the bait is a small mullet or herring, or better still one of the large grubs that bore into trees. In the early spring months it will take a moth readily, either sunk or on the surface. The artificial salmon fly is also a splendid bait for trolling at this time. When moths are scarce a frog is a good bait at night. It must be fastened so that it can swim or, if dead, must be played upon the water to simulate a swimming frog. No perch can resist that bait at night. In summer grasshoppers, especially that known as the 'Pereher,' a red species, are good bait, but the best is a black house-cricket or an earthworm. This is a very attractive bait, and if the perch are in a pool, the lines are no sooner down than the bait is taken. For the rest of the year a prawn is the best bait, that is when crickets cannot be got. The bait should be at least four feet from the float. In landing the fish great care should be used, as the mouth is weak and is easily torn away." These simple instructions appeal mightily to me, some of them are so deliciously Waltonian in their touch, as for instance "if the perch are in a pool," etc.

Stead contributes the following information regarding its capture for the markets:—"The Estuary Perch is a familiar object to most people in the States of New South Wales and Victoria at least, as a few are generally to be seen amongst the fish in every fishmonger's stall. Particularly is this so after heavy freshets in our coastal rivers and during the winter months. After heavy rains have fallen on the watershed of, say, one of our coastal rivers, there is in a short time a superabundance of fresh water, heavily charged with silt and often decayed vegetable matter in the tidal portions of the river; and this has the effect of driving out to the lower and cleaner estuaries or harbour waters, most of

the inhabitants, chief amongst which are the Estuary Perch. As there are then many more fish in a given area than previously, the fisherman is enabled to reap a richer harvest with his meshing-nets and his hauling-nets. The same applies to the winter time, when the fishes come down of their own free will to the open water for the purpose of spawning."

Roughley tells us that—"The flesh of the Estuary Perch is firm and tasty, qualities which render it a valuable and highly esteemed food amongst those who dwell in the districts watered by coastal streams. In addition to this its capture supplies a means of enjoyment to those far removed from the great variety of fishes to be found in the coastal waters." He continues it "is rarely seen in the markets during the summer months. When the fish congregate at the mouths of the rivers, usually during June, July, and August, the markets are kept fairly well supplied."

Mr. H. K. Anderson considers that the Bass is undeniably the premier game fish, whether native or introduced, of the Australian rivers.

Dimensions:—Stead remarks—"Though a weight of 5 lb. is attained by this fish, examples of that size are quite uncommon; the more usual size, as seen in the markets, varying from about 12 oz. to 2 lb." Tenison Woods mentions one of 7½ lb. With reference to this weight I remarked—"As many persons are sceptical of this weight it may be worth mentioning that the writer has seen a specimen, which had been retrieved at the Hamilton Wall, Brisbane River, after an unsatisfactory encounter with a shark. This fish was weighed in my presence, and turned the scale at 6 lb. 12 oz., notwithstanding that a large lump had been bitten out of its flank as cleanly as if done by a surgeon's knife."⁴

Range:—Rivers and estuaries of Southern and Eastern Australia from the Murray River, S.A., to the Pine River, S.Q. Rivers of Northern Tasmania.

PLECTROPLITES Gill.

Plectroplites Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 236 (*ambiguus*): typonym only; id., *ibid.*, 1863, p. 286; Bleeker, Arch. Néerl. Sci. Nat., xi, 1876, p. 267.

Ctenolates Günther, Proc. Zool. Soc. London, 1871, p. 320 (*macquariensis* = *ambiguus*); Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales, xii, 1887, p. 183; Boulenger, Catal. Percif. Fish., 1895, p. 133.

Body subovate and compressed. Scales small, adherent, finely etenoid, the exposed surface concentrically striated, arranged in regular series. Lateral line complete, not continued on the caudal fin, the tubes straight, not extending to the margin of the scale. Head large, with more or less concave upper profile and long pointed snout, partly naked, the mucigerous system strongly developed. Mouth terminal and protractile, with moderate, oblique cleft, the lower jaw projecting; maxillary almost wholly exposed, only the upper edge slipping beneath the preorbital when the mouth is shut, naked; supramaxillary present. Jaws, vomer, and palatines armed with villiform teeth, the premaxillary and mandibular bands interrupted at the symphysis; pterygoids and tongue smooth.

⁴ Ogilby, Commercial Fishes and Fisheries of Queensland, p. 14, footnote 9.

Nostrils subequal and approximate, situated in front of the upper half of the eye, the anterior valvular. Eyes small and superolateral, wholly anteromedian. Preorbital, suborbital, and subopercular bones more or less finely serrulate; preopercle serrated, the teeth of the lower limb antrorsely directed; opercle with two spines, the lower the longer, and a wide naked membranous flap; posttemporal exposed and serrulate. One dorsal fin, with x 10 or 11 rays, the spines strong and pungent, the spinous portion longer than the soft. Caudal rounded, with 17 rays, the upper and lower simple, the others branched. Anal fin short, with iii 7 to 9 rays, the second spine longer and much stronger than the third. Pectoral rounded, with 15 to 17 rays, the middle upper ones the longest. Ventrals inserted below the pectoral-base, close together, with a strong spine and 5 soft rays, the outer of which is produced in a filament. Gill-openings wide; gill-membranes separate, free from the isthmus; branchiostegals seven⁷; pseudobranchiae present; gills four, a slit behind the fourth; gill-rakers rather long and stout, in moderate number. Air-bladder present, large and simple. Pharyngeal bones densely armed with minute conical teeth. Stomach cæcal; intestinal canal biconvolute; pyloric appendages in moderate number. Premaxillary processes not extending to the frontals, parietal and supraoccipital bones not extending to between the postfrontal processes; supraoccipital crest strong, not produced on the frontals. Vertebrae $11 + 15 = 26$.

A monotypic genus, the single species inhabiting the rivers of the eastern half of Australia northward to about the Tropic of Capricorn. Not found in the cismontane rivers of Victoria and New South Wales southward of the Clarence Watershed.

PLECTROPLITES AMBIGUUS (Richardson).

Datnia ambigua Richardson, Zool. Erebus & Terror, ii, Ichth., pt. 1, 1848, p. 25, pl. xix.

Dules ambiguus Günther, Brit. Mus. Catal. Fish., i, 1859, p. 270; Klunzinger, Sitz. Akad. Wien, lxxx, 1880, i, p. 348.

Ctenolates macquariensis Günther, Proc. Zool. Soc. London, 1871, p. 320, pl. xxxiii.

Dules auratus Castelnau, Proc. Zool. & Acclim. Soc. Vic., i, 1872, p. 55.

Dules flavescens Castelnau, Res. Fish. Austr., 1875, p. 10.

Ctenolates ambiguus Günther, Zool. Challenger, i, 1880, Shore Fish, p. 32; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 354; Woods, Fish & Fisher. N. S. Wales, 1882, p. 103; McCoy, Prodr. Zool. Vic., dec. ix, 1882, p. 15, pl. lxxxiv; Ogilby, Catal. Fish. N. S. Wales, 1886, p. 11; Lucas, Trans. Roy. Soc. Vic. (2) ii, 1890, p. 18; Ogilby, Edib. Fish. N. S. Wales, 1893, p. 22, pl. v; Boulenger, Catal. Percif. Fish., i, 1895, p. 134; O'Connor, Proc. Roy. Soc. Queensl., xii, 1897, p. 109; Zietz, Trans. Roy. Soc. S. Austr., 1902, p. 265.

Ctenolates flavescens Macleay, *ibid.*, p. 355; Ogilby, Catal. Fish. N. S. Wales, 1886, p. 11.

Plectroplites ambiguus Bleeker, Arch. Néerl. Sci. Nat., xi, 1876, p. 267; Waite, Syn. Fish. N. S. Wales, 1904, p. 26; Stead, Fish. Austr., 1906, p. 97; *id.*, Edib. Fish. N. S. Wales, 1908, p. 55, pl. xxiii; Zietz, *ibid.*, xxxiii, 1909, p. 268; Roughley, Fish. Austr., 1916, p. 67, pl. xvii.

⁷Boulenger (loc. cit.) gives the number of branchiostegal rays as "six or seven." I have at different times examined quite a large number of specimens, and have invariably found seven. This should, therefore, be taken as the normal number.

YELLOWBELLY.

Golden Perch; Murray Perch; Kaakaalain (Murrumbidgee natives); Tarkee (Lower Murray natives); Callop (Professional Fishermen of Victoria, *vide* Anderson).⁶

Type localities:—West Australia (*D. ambigua*).

Macquarie River (*C. macquariensis*).

Riverina (*D. auratus*).

Murray River (*D. flavescens*).

Upper contour of body rising abruptly at the nape and much more arched than that of the ventral, its width at the shoulders 1.63 to 1.88 in its depth, which is 2.6 to 3 in its length and as long as or a little less than the length of the head. Caudal peduncle about four ninths deeper than long, its least depth 7 to 7.75 in the body-length. Head about one fifth deeper than wide, its width 1.67 to 2 in its length, which is 2.55 to 2.67 in that of the body. Diameter of eye 1.5 to 2 in the length of the snout and 6 to 8 in that of the head; depth of suborbital two thirds to one half of the eye-diameter; interorbital region convex, its width 5 to 6 in the length of the head. Maxillary extending to below or a little beyond the middle of the eye, its length 2.75 to 2.86 in that of the head, the width of its distal extremity as much as to two thirds of the eye-diameter. Hinder border of preopercle evenly serrated, the teeth at the angle much enlarged, those of the lower border usually arranged in groups.

Tooth-bands of jaws broadest in front, gradually narrowing to an obtuse point behind; vomerine teeth forming an obtusely triangular patch; palatine bands curved, similar to those of the jaws.

Scales in 77 to 88 series above the lateral line; 12 or 13/1/33 to 37 scales between the first dorsal spine and the ventral ridge. Cheek-scales smaller, about half as large as those of the opercle. Lateral line forming a long curve from the upper edge of the opercle to below the last dorsal ray.

Dorsal fin originating a trifle behind the pectoral-base; fourth spine longest, 2.55 to 3.14 in the length of the head, and a little lower than the soft portion, the base of which is clothed with minute scales, its length 1.6 to 1.9 in that of the spinous portion. Caudal fin 4.5 to 4.88 in the body-length. Anal fin originating below the first dorsal ray and terminating somewhat behind the last ray; second spine very strong, usually a little longer than the third, its length 2.83 to 3.7 in that of the head and 1.25 to 1.4 in that of the second and longest ray. Pectoral fin 1.75 to 1.9 in the length of the head, the fifth and sixth rays the longest, extending to below the sixth dorsal spine. Ventral fin, without the filament, a little shorter than the pectoral; the filament more developed in the young, in which it reaches nearly to the vent, obsolete or nearly so in large examples.

⁶Anderson writes—"Regarding aboriginal names for this fish I do not know, and believe that most of those names used by the present aborigines are 'pidgin English' and quite unreliable; hence I place no value on them."

Gill-rakers 12 or 13 on the lower branch of the anterior arch, the longest equal to or rather less than the gill-fringes and about one ninth of the length of the head. Pyloric cæca 11.

Upper surface of body varying from bronzy to slaty green, the sides more or less richly golden olive, shading below to deep straw-color or even white. Head above purple or purplish brown, the sides green with violet and orange reflections. Dorsal spines lavender, the connecting membranes yellowish gray dotted with blackish; soft portion tawny yellow, becoming darker towards the margin; caudal fin purplish brown, black-dotted; anal basally golden, the distal third deepening to a violet-brown; pectorals and ventrals golden, uniform or dusky-dotted.⁷

In the Thomson River, and possibly elsewhere, there is a dark color-variety, locally known as the "black yellowbelly," in which the normal coloration is more or less completely obscured by an overlying blackish mantle. This may cover the entire head, body, and fins, or may take the form of numerous small black spots, in some cases generally distributed in others arranged in irregular groups, between which the more typical old gold coloring appears. Structurally no difference can be detected between the two forms. For the opportunity of examining this interesting variety I am indebted to their collector, Miss Josephine Bancroft.

Described from nine specimens, measuring from 225 to 380 mm. Two of these are from the Condamine at Dalby, and were presented to the Museum by Messrs. McNaught and Williams; two are from the Upper Noosa, collected by Mr. J. H. Stevens and myself; and the remaining five are from the Thomson River near Longreach. Of the last three belong to the normal, two to the black, form; all five, however, were taken from the same waterhole.

Variation.—In some respects Boulenger's description differs from mine, and notably in regard to the size of the eye, which according to him is "4.5 (young) to 6 (adult) in length of head," whereas I find it "6 (young) to 8 (adult)" in the same; similarly he gives the width of the distal extremity of the maxillary as 1.5 to 2 in the eye-diameter as compared with the 1 to 1.5 of my measurements. His dorsal spines also are longer than I find them, being 2 to 2.5 in the length of the head as against roughly 2.5 to 3 in mine.

Historical.—The earliest notice of this fine species occurs in the first part of the Ichthyology of the Erebus and Terror, where Sir John Richardson published a description and figure taken from two dried specimens, measuring

⁷ Of the numerous freshly caught examples which I have handled, not one showed the slightest trace of the scarlet markings mentioned by Castelnau (1), and reproduced by Tenison Woods and Roughley in their respective accounts of this fish, while the absence of any reference thereto by McCoy and Stead suggests that their experience coincides with mine. Castelnau's examples were obtained in the Melbourne market, where they were exposed for sale after a railway journey of many miles from their Murray haunts. Consequently I have little doubt that the scarlet patches were merely due to the extravasation of the blood in the affected tissues.

respectively 216 and 356 mm., under the name *Datnia ambigua*, the specific name being suggested by his uncertainty as to which genus, *Datnia* or *Dules*, the fish should more properly be referred. These examples are said to have been collected in "Western Australia" by Sir George Gray, but there is apparently some error as to the alleged locality since, so far as is known at the present day, the species does not occur under natural conditions in any part of the great western State, the rivers of South-Western Queensland being, so far as I can ascertain, the limit of its range in that direction. Fifteen years after the publication of Richardson's description Günther (1) removed the species to the genus *Dules*, giving in the British Museum Catalogue of Fishes a very inadequate account of it, doubtless owing to the fact that he only had the original dried specimens to work on. After an interval of a few years he obtained, through the agency of Mr. Gerard Krefft, a 300 mm. example from the Macquarie River, New South Wales, preserved in liquor, and not at first recognizing its identity with Richardson's fish, proposed for it the new generic and specific names of *Otenolates macquariensis* which, having in the meanwhile realized its true relationship, he subsequently altered to *Otenolates ambiguus*, which name remained in general use until towards the close of last century. Gill, however, had previously recognized the necessity of separating the Australian fish from both *Datnia* and *Dules*, and proposed the generic name *Plectroplites* for its reception. This name was rejected by Dr. Boulenger in his account of the serranoid fishes for the good and sufficient reason that at first it appeared as a typonym only, without any indication of the characters upon which it was based. But Boulenger unfortunately overlooked the fact that in the following year Gill published a diagnosis of his genus which, though short, was amply sufficient to establish the validity of the name, so that it is now generally referred to as *Plectroplites ambiguus*. Count Castelnau then took a hand in building up a synonymy for our "yellowbelly," describing it under two new names in the course of three years. In his first essay he calls it the "Murray Golden Perch," and describes it, from large specimens acquired in the Melbourne market, under the name of *Dulcs auratus*, stating that "it appears to be common in the Murray and other rivers of the Riverina," that it "is much esteemed for the table," and that "it often weighs five and sometimes seven pounds." He notes its similarity to the "*Dules ambiguus* of Richardson and Günther," but considers that the difference of "one ray less in the anal and also less scales on the lateral line" warrants him in separating it from that species. I think, however, that most writers will agree with McCoy that "these differences, which induced Count Castelnau to propose a new specific name, are unimportant." His next attempt, in which he describes a 480 mm. specimen, also from the Murray River, as *Dules flavescens*, is equally futile.

Reproduction.—In 1893 I wrote in regard to this phase of the life history of the Yellowbelly—"These important considerations in the economy of our freshwater fishes will never be properly understood until a competent officer shall be appointed by the Government to report fully on these and all other matters

connected with the fishes and fisheries of our transmontane river systems." Such an officer has since been appointed by the Government of New South Wales, and I am here privileged, through the courtesy of the Under Secretary, Chief Secretary's Department, to record Mr. H. K. Anderson's—the officer in question—observations on the breeding of this fish in the waters under his control. These are of such interest that I deem it advisable to publish Mr. Anderson's remarks *in extenso*:—

"In the spring of 1916 and 1917 I was entrusted with the conduct of experimental hatchery operations in relation to Murray Cod and Golden Perch, and the following information regarding the latter species is based on the data gathered on these occasions.

"In the Murrumbidgee River at an altitude of between 370 and 530 feet above sea level many Golden Perch, usually large fishes from five to ten pounds in weight, spawn during October and November in a flooded river. If the season is late, cold and wet, with snow water coming down stream, spawning is considerably retarded, while abnormally warm weather accelerates it.

"The condition of many of the smaller fishes handled by me leads to the belief that there is an autumnal as well as a vernal spawning, but of this I cannot as yet speak with certainty. Examples of fishes with well developed ovaries are captured by net fishermen throughout the whole year.

"Each spawning female, usually found without female companions, is apparently accompanied by a large number of ripe males. I have never yet netted a ripe female Golden Perch without capturing at the same time, and in the same net, from twenty to fifty ripe males.

"The fishes apparently spawn at the edge of the current near the bank, below a spot where a bend in the river leaves a projecting point with comparatively still eddying water behind it. It is in such places that I have caught all the ripe and most of the nearly ripe females so far examined. As a rule the fish were kept in captivity a few days pending complete ripeness. Many Golden Perch, however, spawn in lagoons and outer channels of the river, where the current is not so strong as in the main stream.

"The fertile eggs are semi-buoyant, practically of the same specific gravity as water, and appear to be left by the fishes quite at the mercy of the current.

"The eggs are probably deposited in batches, 50,000 to 100,000 at a time. I do not think the fish, however ripe, has power to eject all her eggs at once because, when artificially stripping, only a limited number of eggs can be extruded without undue pressure, but I found that, after giving the fish a few minutes rest (rolled in wet bagging to prevent struggling), another batch of eggs can be stripped, and so on until all are extruded.

"A five pounds Golden Perch carries from 750,000 to 1,000,000 eggs.

"The unfertilised eggs when first stripped are of a very pale greyish.

yellow tint. They measure thirty seven to the linear inch (about .686 mm. each).

“Two hours after fertilisation, at an average temperature of 65° F., the eggs are perfectly transparent under the microscope, moving about in the jars from the bottom to the surface; when water was allowed to drip into the jars for aëration the eggs circulated in ceaseless movement all over the jars from top to bottom; some, probably the unfertilised eggs, floated.

“At two hours after fertilisation the eggs measured thirteen to the linear inch (about 1.954 mm. each), and three hours after stripping, when absorption of water was complete, they measured eight to the inch (3.175 mm. each).

“The egg, after full absorption of water, becomes slightly ovate and is perfectly transparent, resembling a tiny soap bubble with a glistening oil globule at the top.

“The eggs referred to above were stripped at 4.35 p.m. on 18th October, 1917. The first apparent development was visible at 10.15 a.m. on 19th October. This appeared as a tiny foggy opaque spot at the bottom of the egg.

“At 6 p.m. on the 19th October, the foggy spots in the egg had increased in size to nearly one eighth of its capacity, but had assumed no definite shape. At 8.50 the faint outline of the embryo was discernible. At this stage it is colorless, semitransparent, and occupies the bottom of the egg. At 10.50 the embryo, including the opaque foggy mass round which it was curved, had increased in size to about one fourth of the capacity of the egg.

“On the 20th October at 5 a.m. the embryo had further increased, and the eye-spot was visible without magnification. At 12.10 p.m., under a magnification of about fourteen diameters, movement of the embryo was plainly visible, and the foggy mass above referred to had considerably decreased in size. At 10 p.m. the embryo was clearly visible to the naked eye, apparently attached by the head to the oil-globule, and its wriggling movements were distinctly seen without a magnifying glass. At midnight the embryo was still suspended from the oil-globule struggling vigorously in the egg. At 1 a.m. on the 21st fully 75 per cent. of the eggs in the jars contained living struggling embryos.

“At 3 a.m. on the same day a cyclonic wind-storm capsized the oil-stove used to warm the tent where the jars were kept, which with its contents was destroyed by fire in a few moments. Several jars of eggs were carried outside the burning tent, but as the temperature fell rapidly all were lost. I think it probable that the eggs would have hatched out at about 10 a.m. that morning.

“Although I continued netting until the 16th November, and captured many hundreds of Golden Perch, none in spawning condition were secured. The season was exceptionally late, wet and cold, and I am of opinion that the general spawning would not take place until December.”

Mr. Anderson supplies also the following note:—

“In November, 1916, similar work was performed in almost identical

conditions, and the records obtained were practically the same as above. Eggs collected at 11 a.m. on the 24th hatched out during the afternoon of the 26th. Owing to a sudden rise in temperature that day—minimum 50°, maximum 95°—the water in the hatching shed reached 75°, and all the fry died. The surface of the jars and troughs was covered with oil from the eggs, and a great number of dead fry, about the size of a comma in ordinary newspaper text, were floating at the surface. The shells of the eggs retain their transparency, and quickly dissolve without leaving any sediment or residue.”

It is much to be regretted that Mr. Anderson's two attempts to elucidate the larval development of this fish met with unmerited failure in both cases through causes entirely beyond his control, and it is to be hoped that the very failure will further stimulate him to carry on future experimental work to a successful conclusion.

According to Mr. Glencross Smith the Yellowbelly is full-roed early in September on the Darling Downs.

Uses, etc.:—All authorities concur in their appreciation of the edible qualities of this species. Stead writes—“As an article of food the Golden Perch is very well and favourably known, both in the western areas (of New South Wales) and in the cities of Sydney and Melbourne.” Roughley tells us that—“As an edible fish the Golden Perch ranks second only to the Murray Cod amongst our indigenous fresh-water fishes. Its flesh is firm and tasty and is well suited to the many methods of preparation for the table. It is deservedly popular and finds a ready sale in the markets.” Glencross Smith, while acknowledging its excellence, places it third in rank among our fresh-water food-fishes, considering it inferior to the catfish (*Tandanus tandanus*) and the Murray Cod, while Anderson places above it the Trout Cod (*Oligorus mitchelli*) and the Murray Cod.⁸ However he continues—“I do not desire to dogmatise, as I know several men of wide experience, including Mr. Henry Dawson, late Inland Fisheries Commissioner, who place the Golden Perch the first among our inland fishes.” From the little I know gastronomically of the two species I am inclined to agree with Mr. Dawson.

From the angler's point of view they are held in good repute, being plucky and determined fighters when hooked. Writing of them in this connection Mr. Smith says—“Yellowbellies lurk in weedy patches under the shade of logs and overhanging trees, and dart out upon their food, taking it with a rush, and are more particular about their food than Cod. They prefer frogs, shrimps, yabbies, worms, and the white grub from the River Oak (*Casuarina*); also crickets; but they do not care for fish bait. They are fine sporting fishes and will take a spinning bait, and were at one time very plentiful in all our streams, but are gradually being wiped out; dynamite, nets, and no close season being the

⁸ In Part II of the present volume I hope to deal with the various phases of the genus *Oligorus*.

cause." He has also remarked that the Yellowbelly is the most short-lived of our fresh-water fishes after its removal from the water, invariably dying within five minutes of its capture.

Anderson remarks—"The food of the Golden Perch consists principally of small fishes, including its own species, yabbies, prawns, and insect larvæ. It prefers live food. The most effective baits for the capture of this fish are small live fishes, yabbies, prawns, and artificial spinners. The Aborigines on the Murray seem to prefer the yabbie. The Golden Perch will not, I think, rise to the surface for an artificial fly, but a salmon fly skilfully worked through the water, particularly if fitted with a spinning head, will tempt them. From the point of view of sport I consider the Golden Perch second among the fishes of the Murray System."

Stead informs us that "it is pre-eminently what might be called a 'still-water' fish, being very abundant in lagoons and billabongs. It is also a 'mid-water' fish; that is, it swims at some distance from the bottom usually. It is a fish of the plains rather than one of the mountains." Further on he says—"Though taken by hook and line, the usual method of capture is by means of a short meshing-net (gill-net) which is set at night across the billabong or lagoon." And, quotes the evidence of a professional fisherman, as telling him "that one of this species will blunder straight into a meshing-net, apparently without seeing it; while a Murray Cod under the same circumstances would swim up to within a short distance of the net, and then quickly take fright and double back again."

Dimensions:—In large rivers, such as the Murray and its more important tributaries, the Yellowbelly grows to a considerable size. The largest weighed by Mr. Anderson was a female, taken in Yanco Creek, which turned the scale at 14 lb. 2 oz. This, however, seems to be quite an unusual size, most writers being content to credit it with a maximum weight varying between 7 and 10 lb.; while according to Roughley the average of the fishes sent to the Sydney Market is from 4 to 5 lb. In the Queensland rivers, with their lesser volume of water, it does not as a rule attain to such a size as in more southern streams, nevertheless specimens approximating to the 10 lb. limit are occasionally captured, and I have before me now a photograph, given to me by Mr. Glencross Smith, of an example taken in Oakey Creek, which weighed 9 lb. 12 oz.

Range:—All the rivers of the Murray System; cismontane rivers of Eastern Australia from the Clarence to the Dawson; rivers of South-Western Queensland—Barcoo, Landsborough, Cooper, and Diamantina (*Anderson*); Thomson River, common (*Miss Bancroft*). Dr. T. Bancroft writes—"The Yellowbelly does not occur in the Burnett River, but I caught a few by netting in the Upper Dawson."

PART XI.—LUTIANIDÆ (No. 2).

LUTIANUS NEMATOPHORUS Bleeker.

(Plate I.)

Mesoprion nematophorus Bleeker, Act. Soc. Sci. Indo-Neerl., viii, 1860, Celebes, p. 56; id., Versl. Akad. Amst., xii, 1861, p. 46.
Lutjanus nematophorus Bleeker, Verh. Akad. Amst., xiii, 1873, Revis. Lutjan., p. 12; id., Atlas Ichth., viii, 1876, p. 47, pl. cclxxxv, fig. 3.

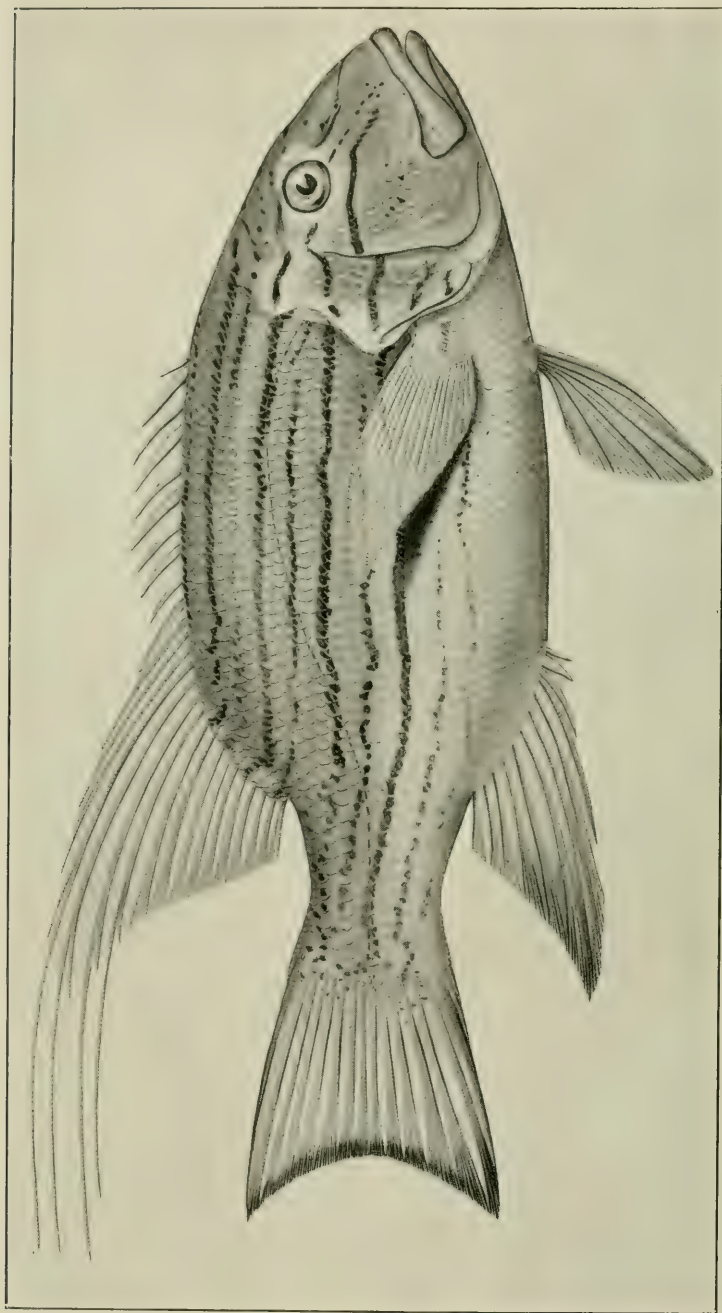
THREADFINNED SEA PERCH.

Type locality:—Celebes.

Body deeply subovate and strongly compressed, the dorsal and ventral contours symmetrical, its width 2.55 in its depth, which is 2.55 in its length to the root of the caudal and one eighth more than the length of the head. Caudal peduncle three eighths longer than deep, its least depth 2.5 in the length of the head. Head two ninths longer than deep, its upper profile behind the snout and that of the nape gently and evenly rounded, its width 2.25 in its length, which is 2.85 in that of the body. Snout long and pointed, with linear moderately acclivous profile, its length 2.33 in that of the head. Eye small, its diameter 2.37 in the length of the snout, 5.44 in that of the head, and 1.5 in its distance from the end of the maxillary groove. Interorbital region convex, its width one eighth more than the eye-diameter and 4.87 in the length of the head. Jaws subequal; maxillary extending to below the anterior border of the eye, its length 2.5 in that of the head, the width of its subtruncate distal extremity 1.3 in the eye-diameter. Preopercle with a slight emargination above the angle, in and beyond which it is feebly serrulate; opercle without spine, the lobe obtusely pointed; post-temporal feebly serrated.

Scales in 57 series above the lateral line, disposed somewhat obliquely to the dorsal profile, in 51 horizontal series below the line; 8/1/22 scales between the first dorsal spine and the ventral ridge. Head naked, except the opercle, subopercle, a patch from seven to nine scales wide on the cheek posteriorly, a triserial postorbital band, and a short biserial temporal band. Lateral line with 54 pore-bearing scales, the tubes branched. Soft dorsal and anal fins each with a well developed scaly sheath, the membranes naked; accessory ventral scale small and blunt, 1.5 in the eye-diameter.

Dorsal fin with x 17 rays, originating above the lower angle of the pectoral-base, the spinous portion one fifth longer than the soft; spines low, slender but pungent, increasing in length to the fifth, beyond which they decrease to the ninth; last spine a little longer than the fifth and 3.44 in the length of the head; fourth to seventh rays produced and filiform, extending to or beyond the extremity of the caudal; beyond these the rays gradually decrease, the last being about equal to the fifth spine. Caudal emarginate, the middle rays 1.5 in the upper lobe, which is 3.67 in the body-length. Anal fin with iii 9 rays, originating below the third dorsal ray; spines short and stout, the third longest, 4.14 in the length of the head; soft portion with acutely pointed outline, the anterior rays produced, the fourth the longest, extending beyond the base of the caudal, length



LUTJANUS NEMATOPHORUS Bleeker.

Phyllis Clarke, del.

of soft portion 2.37 in its height, 1.75 in that of the dorsal fin, and 2.55 in that of the head. Pectoral with 16 rays, its length 1.22 in that of the head; fifth ray longest, extending to below the first dorsal ray. Ventral inserted below the end of the pectoral-base; spine rather weak but much longer than the longest dorsal spine, 1.75 in the outer rays, which are subequal, 1.13 in the length of the pectoral, and reach almost to the vent.

Gill-rakers short and stout, 10 on the lower branch of the anterior arch, the longest 1.8 in the eye-diameter.

Roseate, the lower surfaces lighter and obscurely tinged with yellow; body with ten narrow, more or less wavy, longitudinal blue bands; the upper pair meet across the nape; the second pair extend upon the occiput, where they are broken up into irregular spots; the third reaches to above the post-temporal, beyond which it is similarly broken up; the fourth is continued forward to the eye and, though less clearly, along the upper eyelid and across the nostrils, meeting near the end of the snout; the fifth ceases at the opercle; these five pairs terminate at various points along the base of the dorsal fin; the sixth reaches to the eye and is continued on the snout as a series of small blue spots, which meet across the tip of the snout; the seventh extends to the opercle; the eighth to the middle of the preorbital; the two lower to the pectoral, in front of which are some irregular spots and bars; a narrow blue cross-bar between the eyes. All the fins pinkish, the caudal with a narrow dark terminal band.

Described from a fine specimen, 353 mm. long, trawled in Hervey Bay, and presented to the Queensland Museum by the Department of Fisheries through Captain Hoult of the "Bar-ea-Mul."

The species was only known previously from two young examples, measuring 82 and 86 mm., recorded by Bleeker from Singapore and Celebes. Its rediscovery on the South Queensland coast is, therefore, of more than ordinary interest.

PART XVI.—OPISTHOGNATHIDÆ (No. 1).

Opisthognathidæ Jordan & Evermann, Fish. North & Mid. America, pt. 3, 1898, p. 2279; Regan, Ann. & Mag. Nat. Hist. (8). xii, July 1913, p. 138.

THE JAWFISHES OR SMILERS.

Body elliptical to elongate, moderately compressed, more or less completely covered with small, cycloid scales. Lateral line single, incomplete, running close to and parallel with the dorsal contour, ceasing below the anterior dorsal rays. Head large and naked, with strongly curved anterior profile, its upper surface smooth. Mouth terminal, horizontal or nearly so, protractile, the cleft usually very wide; jaws normally formed; maxillary broad and exposed, with supplemental bone. Jaws with bands of villiform or cardiform teeth; vomer usually with a few teeth; palatines and tongue toothless. Two nostrils on each side. Eyes very large, lateral, anterior. Opercles unarmed. Dorsal fin continuous, the spinous and soft portions of nearly equal length, the spines slender and flexible,

passing gradually into soft rays. Caudal rounded or lanceolate, with 14 or 15 principal rays, the outer ray above and below simple. Anal fin long and low, with two weak spines. Pectorals short and fan-shaped. Ventrals inserted in advance of the pectorals, close together, each of a spine and five rays, and without accessory scale. Gill-openings wide; gill-membranes partially united, free from the isthmus; six branchiostegals; pseudobranchiæ present; gills four, a slit behind the fourth; gill-rakers long and slender. Air-bladder present, small. No pyloric caeca. A narrow subocular shelf. Skull narrow between and expanded behind the orbits; postorbital part evenly convex above; occipital crest only on the posterior face of the skull, which is long and oblique; no parietal crest; exoccipital condyles separate; prootics forming a roof for the myodome; basisphenoid present. Foramen in hypercoracoid; radials rather broad and flat, two on the hypercoracoid and two on the hypocoracoid. Vertebrae 29 (10×19)⁹; precaudals with parapophyses from the fifth; three ribs sessile, five on parapophyses; epipleurals on ribs.

The *Opisthognathidae*, though weak in point of numbers, forms a most interesting family of trachini-form percoids; it consists of fishes of small or moderate size, inhabiting rocky and coralline bottoms within the tropical and temperate zones. Its distribution is peculiar, no species having so far been recorded from the Mediterranean nor the Eastern Atlantic, nor from any of the Pacific Islands, nor the West Coast of the Americas, except the Gulf of California, where an isolated colony, comprised of five species, exists. The extreme limits of their polar range lie between lat. 40° N., where *Gnathypops hopkinsi* has been taken off Misaki, Japan, and lat. 34° S., where *Merogymnus jacksoniensis* is found. These fishes are everywhere of rare occurrence, many of the species being only known from the single example described. The "Smilers," to give them the local vernacular name bestowed upon them, so a friend tells me, "because of their fine open countenance," are essentially carnivorous and rock-loving fishes, delighting in boulder-strewn shoals and coral reefs at a moderate depth. Hence we find that in America as here many of the species are only known from off-shore snapper grounds and similar localities, where they are occasionally taken by hand-line in company with more valuable fishes or even from the latter when captured disgorging them. The species vary greatly in coloration, some of them, such as my *Merogymnus eximius*, being arrayed in a livery of most gorgeous splendor, while others, as my *Gnathypops inornata*, are soberly clad in uniform brown. One of our species, *G. maculata*, is said by the pearl-fishers to scoop holes in the sand among the sea-fan forests of our tropic seas, from which it sallies forth to pounce upon a passing prey, returning again to its lair after each excursion. Regarding this habit Mr. W. H. Longley, from personal observation when "equipped with a diving hood in the unknown world of coral labyrinths at the bottom of the sea," gives some interesting information, which may advantageously be reproduced here.¹⁰ He writes:—"Gnathypops aurifrons prepares

⁹ Vertebrae 27 to 34, *vide* Jordan & Evermann, *ut supra*.

¹⁰ American Museum Journal, xviii, February 1918, p. 81.

its own shelter in sandy places where the substratum is sufficiently compact to make successful tunneling possible. Jaws and gaping mouth are its only entrenching tools, but meet its every need. It is found not uncommonly upon the open reef in little colonies, the formation of which is probably due in part to the discontinuous occurrence of suitable bottom rather than to the social instincts of the fishes themselves. During the day, if undisturbed, *Gnathypops* may be regularly observed resting nearly motionless in a semivertical position above its burrow. When alarmed it retreats into its hole tail foremost and conceals itself until the disturbance outside has ceased. Then it reappears cautiously, its beady black eyes being so situated that it is able to sweep the horizon with minimum exposure. If nothing happens to renew its alarm, it mounts a little farther until its ventral fins are free, rests for a moment in the mouth of its burrow, and finally rises easily and gracefully to its original position. Still another of these fishes (as yet unidentified) shows a different variation of the tubiculous instinct. It lives in holes, quite possibly worm-tubes, which it discovers ready formed in pieces of dead coral upon the bottom. Its most striking structural feature is the immense dorsal fin, which when raised seems nearly as high as the fish is long. Its most interesting habit is that of protruding its body for about half its length from the chamber it occupies, and then elevating and depressing its great fin rapidly as if it were wigwagging in piscine code. This impression is heightened when two individuals separated by no great distance stand erect and repeat the performance in alternation." Nothing is known as to the breeding habits of these fishes, nor have I ever seen an example with ripe spawn, though all those which I have handled were fully adult. That the young are never found along the fore-shores nor in the débris of the seine net seems to demonstrate the demersal character of the ova. No data are available as to their edible qualities, unless it be that of an acquaintance, who took one home and had it fried; he told me it was "as good as any other rockfish." On account of their scarcity and the difficulty of obtaining them all the species are greatly in request for museum collections, and every example should, therefore, be carefully preserved and forwarded, with as little delay as possible, to the nearest scientific institution. Six genera and thirty species are now recognized. As mentioned by Waite it has been suggested in some quarters that *Gnathypops* may merely be the female of *Opisthognathus*, but the fact that the latter genus is quite unknown in Australian waters sufficiently contravenes any such theory.

Appended is a key to the opisthognathoid genera. Those which are printed in italics have not so far been found in Australian seas, but, with the exception of the West Indian *Lonchopisthus* there is no insuperable reason why the other genera should not occur here.

*a*¹. Maxillary about as long as the head, produced behind in a flexible lamina i. *Opisthognathus*.¹¹

*a*². Maxillary much shorter than the head, but extending well beyond the eye, its distal extremity truncate.

¹¹ Cuvier & Valenciennes, Hist. Nat. Poiss., xi, 1836, p. 498. Type *O. sonneratii* = *O. nigromarginatus* Rüppell.

- b*¹. Caudal fin rounded.
- | | |
|--|---|
| <i>c</i> ¹ . Trunk anteriorly naked | ii. <i>Merogymnus</i> . |
| <i>c</i> ² . Trunk everywhere scaly. | |
| <i>d</i> ¹ . Dorsal spines all simple | iii. <i>Gnathypops</i> . |
| <i>d</i> ² . Anterior dorsal spines transversely forked | iv. <i>Stalix</i> . ¹² |
| <i>b</i> ² . Caudal lanceolate | v. <i>Lonchopisthus</i> . ¹³ |
| <i>a</i> ³ . Maxillary not extending beyond the eye | vi. <i>Owstonia</i> . ¹⁴ |

i. MEROGYMNUS Ogilby.

Merogymnus Ogilby, Proc. Roy. Soc. Queensl., xxi, 1908, p. 18 (*eximius*); McCulloch, Rec. West Austr. Mus., i, 1914, p. 216.

Body elliptical or elongate-elliptical, the greater part of the trunk naked. Maxillary much shorter than the head, its distal extremity much dilated. Jaws with bands of villiform teeth, the outer row scarcely larger than the others. Caudal fin rounded. Gill-rakers in rather large number, long, and slender.

Eastern and South-Eastern Coasts of Australia. Two species.

- | | |
|---|---------------------------|
| <i>a</i> ¹ . Scales very small, covering about half of the sides and belly | 1. <i>eximius</i> . |
| <i>a</i> ² . Scales larger, but narrowly entering the trunk; belly naked | 2. <i>jacksoniensis</i> . |

1. MEROGYMNUS EXIMIUS (Ogilby).

(Plate II.)

Merogymnus eximius Ogilby, Proc. Roy. Soc. Queensl., xxi, 1908, p. 18.

HARLEQUIN SMILER.

Type locality:—Snapper Banks off Moreton Bay, S.Q.

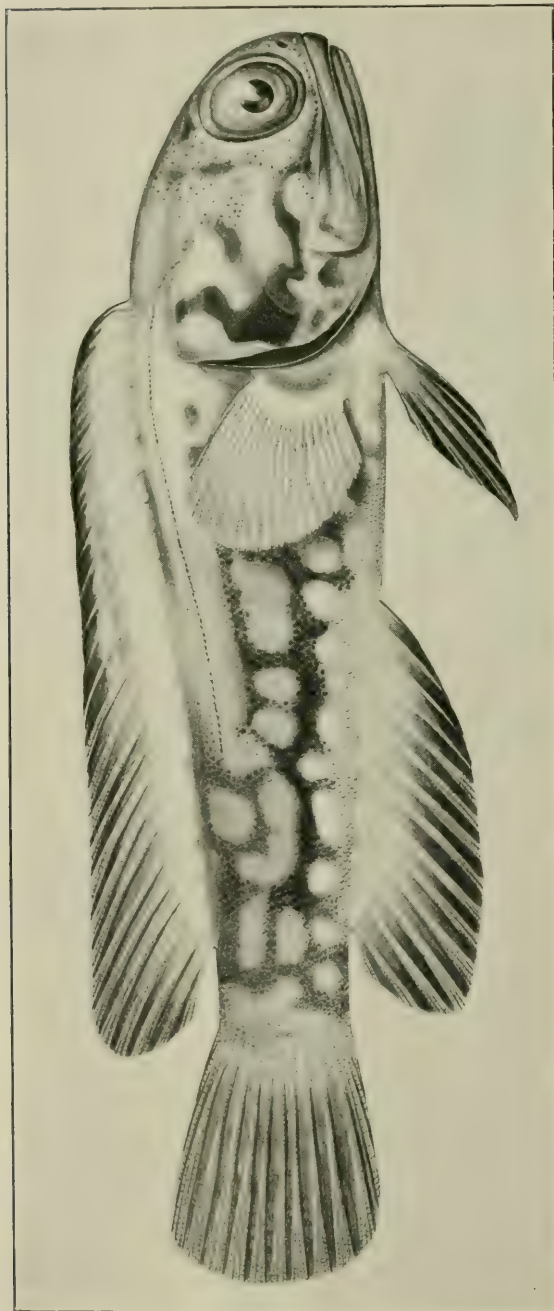
Body elliptical; its width at the shoulder 1.7 to 1.83 in its depth, which is 3.62 to 3.75 in its length and 1.25 to 1.33 in the length of the head. Caudal peduncle four fifths deeper than long, its least depth 2.55 to 2.7 in the length of the head. Head a little deeper than wide, the fronto-occipital profile evenly rounded, its width 1.4 to 1.5 in its length, which is 2.83 to 2.9 in that of the body. Snout short, with linear or gently rounded, vertical profile, its length 1.75 to 1.8 in the eye-diameter, which is 2.83 to 3.2 in the length of the head. Interorbital region narrow and feebly concave, its width 3.43 to 3.75 in the eye-diameter. Maxillary extending to about one diameter of the eye behind the eye, its length 1.4 to 1.5 in that of the head, the width of its distal extremity about two ninths of its length.

Scales extending forwards on the trunk to below the middle of the

¹² Jordan & Snyder, Proc. U. S. Nat. Mus., xxiv, 1902, p. 495. Type *S. histrio* from the Japanese coast.

¹³ Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 241. Type *L. micrognathus* from Cuban waters.

¹⁴ Tanaka, Journ. Coll. Sci. Tokyo, xxiii, 1908, p. 47. Type *O. totomiensis* from the seas of Japan.



MEROGYMNUS EXIMIUS Ogilby.

Phyllis Clarke, del.

appressed pectoral, anteriorly distant and deeply imbedded, becoming more crowded and finally imbricate on the tail; belly scaly. Lateral line composed of about 80 short tubes, terminating below the 5th or 6th dorsal ray.

Dorsal fin with xi 13 rays, originating above the tip of the maxillary; outer border of the fin linear, the spines and rays gradually increasing in length to the 9th to 11th rays, which are 1.63 to 1.75 in the length of the head. Caudal fin long, 3.9 to 4.3 in the body-length. Anal with i 12 or 13 rays, originating below the 1st dorsal ray, its longest ray 1.7 to 1.83 in the length of the head. Pectoral rounded, with 19 rays, the middle the longest, 1.88 to 2 in the head. Ventral produced, about one third longer than the pectoral, the 2nd and 3rd rays subequal, reaching to or nearly to the vent.

Gill-rakers long and slender, with the inner edge feebly spinulose, 16 + 26 on the anterior arch, the longest 2.16 in the eye-diameter.

Golden or golden brown above; sides with two series of large, round or oval, golden spots, separated by broad blue interlacing bands; abdominal region and extremity of tail violet, with splashes of greenish gold. Head lilaceous, with irregular violet spots and bars; a deep blue blotch, prolonged upwards as an uneven band on the opercle; branchiostegal region blackish. Outer half of spinous dorsal dark olive-green, narrowly bordered above with purple, below with pale blue; the lower band is continued to the end of the soft dorsal, the outer half of which is pale olive-green, with part of the membrane blue, as also is the base. Anal blue, with a median and a basal series of golden spots. Caudal rays olive-green or purple, the interradiat membrane blue. Pectoral pale yellowish brown, the base with one or two vertical blue bars. Ventral bluish black.

Described from five specimens, 224 to 305 mm. in total length, in the collections of the Queensland Museum and the Amateur Fishermen's Association. These were taken on the Snapper Grounds off Moreton Bay, where it does not appear to be uncommon, and which is still the only recorded habitat of the species. It is said to be good eating.

Our illustration is taken from a Queensland Museum example. Reg. No. I. 17/2840.

2. *MEROGYMNUS JACKSONIENSIS* (Macleay).

Opisthognathus jacksoniensis Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 570; O'Connor, Proc. Roy. Soc. Queensl., iv, 1888, p. 43.

Gnathypops jacksoniensis Waite, Rec. Austr. Mus., v, 1904, p. 240, pl. xxvi, fig. 2.

Merogymnus jacksoniensis McCulloch, Rec. West Austr. Mus.,

SOUTHERN SMILER.

Type locality:—Port Jackson, N.S.W.

Body elongate-elliptical, its width at the shoulder 1.6 to 1.75 in its depth, which is 4.33 to 4.5 in its length and 1.4 to 1.55 in the length of the head. Caudal peduncle three fourths deeper than long, its least depth 3.44 to 3.6 in the length of the head. Head a little deeper than wide, the fronto-occipital profile

linear or gently rounded and moderately acclivous, its width 1.5 to 1.67 in its length, which is 3.12 to 3.33 in that of the body. Snout short, with feebly rounded subvertical profile, its length 1.5 to 1.63 in the eye-diameter, which is 3.25 to 3.5 in the length of the head. Interorbital region narrow and concave, its width 3.33 to 3.6 in the eye-diameter. Maxillary extending to about one diameter of the eye behind the eye, its length 1.6 to 1.67 in that of the head, the width of its distal extremity 3.16 to 3.5 in its length.

Scales extending forwards along the middle of the trunk to above the vent only, the naked area extending backwards above and below in a gradually contracting band to about the last third of the vertical fins; only those scales on or near the caudal peduncle truly imbricate; belly naked. Lateral line terminating below the 12th or 13th dorsal ray.

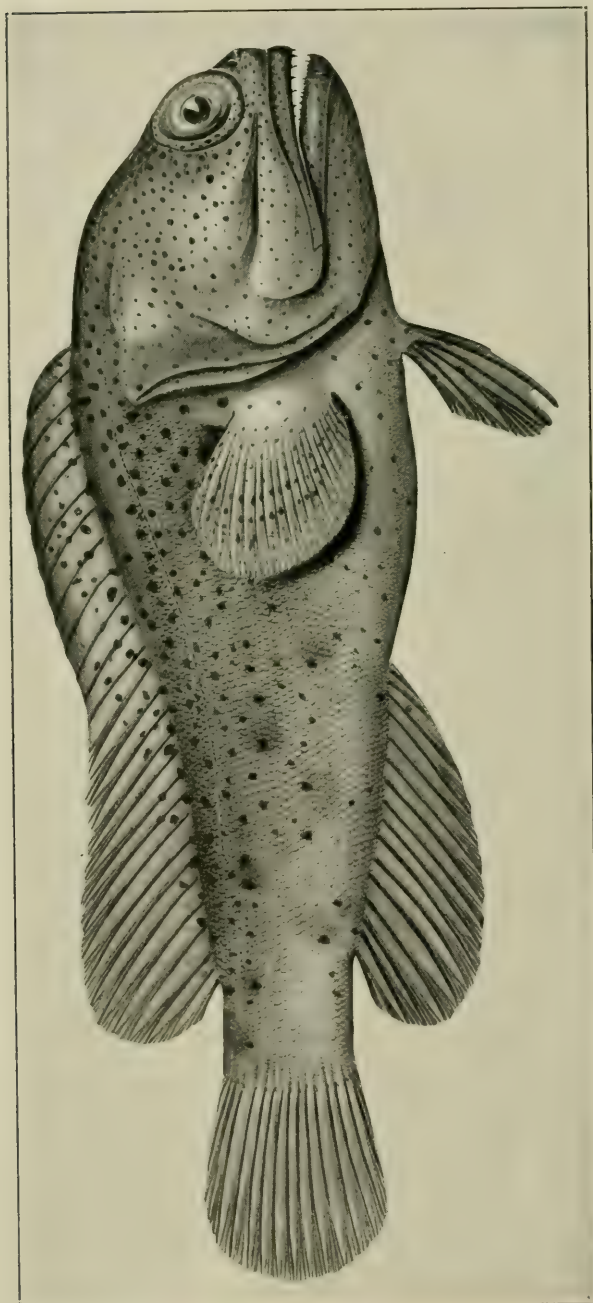
Dorsal fin with x 17 rays, originating well behind the tip of the maxillary; outer border of spinous dorsal rounded in front, linear behind, the spines gradually increasing in length to the last, but much lower than the soft rays, the 12th or 13th of which is the longest, 2 to 2.33 in the length of the head. Caudal fin short, 5.16 to 5.67 in the body-length. Anal with i 16 rays, originating below the 2nd or 3rd dorsal ray, the longest ray corresponding to and as long as those of the dorsal. Pectoral rounded, with 20 rays, its length 1.83 to 2 in that of the head. Ventral as long as or a little longer than the pectoral, the 2nd ray somewhat produced, but not nearly reaching to the vent.

Gill-rakers long and moderately slender, with the inner edge spinulose, $9 + 19$ or 20 on the anterior arch, the longest 2.1 in the eye-diameter.

Ground-color varying from rich light brown to lemon yellow, the upper surface and sides of the trunk broadly reticulated with chocolate brown, a wavy median band, which is sometimes black, being always present; throat, breast, and belly immaculate; tail with a few irregular brown spots and wavy lines, each scale with a brown central dot. Upper surface and sides of head profusely dotted and pencilled with brown; inner posterior edges of maxillary and mandible black; distal extremity of maxillary and a broad stripe on the mandible white. Dorsal fin dark purplish brown, with a basal series of lighter spots; soft portion with an additional submarginal row of similar spots and two oblique bands posteriorly. Anal rich brown, with a light basal band. Caudal with three transverse rows of light spots. Pectoral pale yellow, profusely powdered with brown. Outer portion of ventrals purplish black.

Described from four specimens, 212 to 264 mm. in total length, in the collection of the Queensland Museum; they were taken by hook on the Snapper Grounds off Moreton Bay, where, however, it appears to be scarce.

Originally described from Port Jackson in 1881, its range was extended, eight years later, to the Queensland Coast, through a specimen obtained in Moreton Bay by the late Mr. D. O'Connor; these two localities still form the extreme limits of its recorded distribution.



GNATHYPOPS MACULATA (Alleyne and Macleay).

Phyllis Clarke, del.

Waite is certainly incorrect in stating that "the premaxilla is much shorter (than the maxilla), and does not extend to below the hinder margin of the eye." As a fact it is as long as the maxillary, but its distal third is slender and toothless, composed of flexible cartilage. Nor in those which I have examined has the bony interorbital bridge ever been so narrow as described by him.¹⁵

The name "leopard fish" applied to this species by Waite¹⁶ and Stead¹⁷ is inappropriate, as it rightly belongs to *Plectropoma maculatum* Bloch, the *Holocentrus leopardus* of Lacépède.

ii. GNATHYPOPS Gill.

Gnathypops Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 241 (*maxillosa*); Jordan & Evermann, Fish. North & Mid. Amer., pt. 3, 1898, p. 2283; McCulloch, Rec. West Austr. Mus., i, 1914, p. 216.

Differs from *Merogymnus* in having the trunk wholly covered with scales, the outer row of teeth enlarged, and the gill-rakers fewer, shorter, and stouter.

The most prolific genus of the family, containing 20 species, ranging from the Persian Gulf through the Indian and Malayan seas northward to Japan and eastward to New Guinea and East Australia. Crossing the Pacific it reappears on the coasts of Lower California and Western Mexico, reaching thence to the shores of the Southern United States, the West Indies, and Brazil. Three species occur in Australian waters, and have been thus classified by McCulloch—

- α^1 . Body and fins light, with numerous small, dark brown spots 1. *maculata*.
 α^2 . Body and fins dark, sometimes with irregular, scattered darker spots 2. *inornata*.¹⁸
 α^3 . Head with small, body with large, incomplete, brown rings; dorsal, anal, and caudal fins with oblique bars, the former with a large, black spot anteriorly 3. *darwiniensis*.¹⁹

3. GNATHYPOPS MACULATA (Alleyne & Macleay).

(Plate III.)

Opisthognathus maculatus Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales, i, 1877, p. 280. pl. ix, fig. 3.

Batrachus punctatulus Ramsay, Proc. Linn. Soc. N. S. Wales, viii, 1883, p. 177.

Gnathypops maculatus McCulloch, Rec. West Austr. Mus., i, 1914, p. 216.

SPECKLED SMILER.

Type localities:—Palm Isles, N.Q. (*O. maculatus*).

Torres Strait, N.Q. (*B. punctatulus*).

Body elliptical, its width at the shoulder 1.84 in its depth, which is 3.1 in its length and 1.2 in the length of the head. Caudal peduncle one and a half time

¹⁵ Rec. Austr. Mus., v, p. 240.

¹⁶ Synop. Fish. N. S. Wales, p. 30, No. 231.

¹⁷ Fish, Austr., p. 108.

¹⁸ Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales, xii, 1887, p. 561; Derby, N. W. Australia. The species has been beautifully figured by McCulloch, Rec. West Austr. Mus., i, pl. xxx.

¹⁹ Macleay, Proc. Linn. Soc. N. S. Wales, ii, 1878, p. 355, pl. ix, fig. 3; Port Darwin, N.T.

deeper than long, its least depth one third of the length of the head. Head a little wider than deeper, the fronto-occipital profile linear and strongly acclivous, that of the nape rounded, its width 1.33 in its length, which is 2.55 in that of the body. Snout short, with linear, subvertical profile, its length 1.25 in the eye-diameter, which is 3.67 in the length of the head. Interorbital region narrow and concave, its width one third of the eye-diameter. Maxillary extending rather more than an eye-diameter behind the eye, its length 1.5 in that of the head, the width of its distal extremity 3.9 in its length.

Scales everywhere imbricate, disposed in regular series over the whole body, becoming somewhat larger posteriorly. Lateral line terminating below the 9th dorsal ray.

Dorsal fin with xii 16 rays, originating well behind the tip of the maxillary; outer border of spinous dorsal rounded in front, linear behind, the spines gradually increasing in length to the last, but lower than the soft rays, the 8th, 9th, and 10th of which are the longest, a little more than half the length of the head. Caudal fin of moderate length, 4.6 in the length of the body. Anal with ii 14 rays, originating below the 3rd dorsal ray, the rays increasing in length to the 4th, which is 2.37 in the length of the head and as long as the succeeding seven, beyond which they decrease. Pectoral rounded, with 21 rays, all except the upper and lower pair about equal in length, and 2.25 in the length of the head. Ventral longer than the pectoral, none of the rays produced.

Gill-rakers $4 + 12$ and some tubercles, rather stout and cultriform, the longest 2.3 in the eye-diameter,

Pale rufous brown, scarcely lighter below, everywhere spotted with dark blue or black, the spots largest on the upper part of the trunk and tail, smallest on the head; a large blackish or smoky brown blotch beneath the appressed pectoral. Spinous dorsal sparsely, pectorals profusely spotted; the other fins immaculate.

Described from a fine specimen, measuring 346 mm. in total length. collected at Dobo, Aru Islands, by Mr. John Colclough, who presented it to the Amateur Fishermen's Association of Queensland, by whom it was kindly lent for the purposes of this review.

This fine species was first described from a small example, 178 mm. long. obtained at the Palm Isles, N.Q., during the cruise of the "Chevert." We next hear of it from Torres Strait, through a specimen forwarded to the Australian Museum by Mr. Cousens, and described as a *Batrachus* by the late Dr. E. Pierson Ramsay. A few years later Saville Kent, when a guest on board H.M.S. "Myrmidon," collected one at Port Darwin, N.T., as recorded by de Vis. From that time I find no record of the species until 1906, when Mr. Banfield sent me a 320 mm. example from Dunk Island, while in the following year the specimen described and figured came into my hands. It is said to be good eating.

LIST OF THE OPISTHOGNATHOID FISHES OF THE INDIAN AND
WESTERN PACIFIC OCEANS.

- i. OPISTHOGNATHUS Cuvier & Valenciennes, Hist. Nat. Poiss., xi, 1836,
p. 498 (*sonneratii* = *nigromarginatus*).
1. *nigromarginatus* Rüppell, Atlas Fisch. Roth. Meer., 1828, p. 114.
Distribution:—Red Sea and Mozambique Channel through the Seas of
India and Malaysia to Celebes and Batchian.
Dimensions:—To 180 mm..
Figure:—Day, Fish. India, pl. lvii, fig. 5.
- ii. MEROGYMNUS Ogilby; *see* p. 24.
2. *eximius* Ogilby; *see* p. 24.
 3. *jacksoniensis* Macleay; *see* p. 25.
 4. *iyonis* Jordan & Thompson, Proc. U. S. Nat. Mus., xlv, 1913, p. 65. Only
known from the type.
Distribution:—Iyo, Shikoku, Japan.
Dimensions:—74 mm.
Figure:—Jordan & Thompson, *ibid.*, text-fig. 1.
- iii. GNATHYPOPS Gill; *see* p. 27.
5. *darwinensis* Macleay, Proc. Linn. Soc. N. S. Wales, ii, 1878, p. 355.
Distribution:—Port Darwin, N.T. Only known from the type.
Figure:—Macleay, *ibid.*, pl. ix., fig. 3.
 6. *dendritica* Jordan & Richardson, Bull. U. S. Bur. Fisher., xxvii, 1908, p. 261.
Only known from the type.
Distribution:—Cuyo Island, Philippine Archipelago.
Dimensions:—133 mm.
Figure:—Jordan & Richardson, *ibid.*, text-fig. 9.
This species should be carefully compared with the preceding.
 7. *evermanni* Jordan & Snyder, Proc. U. S. Nat. Mus., xxiv, 1902, p. 493.
Only known from the typical specimens.
Distribution:—Wakanoura, Japan.
Dimensions:—80 mm.
Figure:—Jordan & Snyder, *ibid.*, text-fig. 6.
 8. *hopkinsi* Jordan & Snyder, *ibid.*, p. 492.
Distribution:—Misaki and Sagami, Hondo, Japan.
Dimensions:—To 80 mm.
Figure:—Jordan & Snyder, *ibid.*, text-fig. 5.

9. *inornata* Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales, xii, 1887, p. 561.
Distribution:—Coast of North-Western Australia (Derby and Port Headland).
Dimensions:—To 485 mm.
Figure:—McCulloch, Rec. West Austr. Mus., i, pl. xxx.
10. *macrolepis* Peters, Mon. Akad. Berlin, 1866, p. 520.
Distribution:—Bangkok, Siam, to the Philippines.
Dimensions:—To 100 mm.
Unfigured.
11. *maculata* Alleyne & Macleay; see p. 27.
12. *muscatensis* Boulenger, Proc. Zool. Soc., 1887, p. 662.
Distribution:—Persian Gulf at Maskat, Arabia.
Dimensions:—To 305 mm.
Figure:—Boulenger, *ibid.*, pl. liv, fig. 1.
13. *papuensis* Bleeker, Versl. Akad. Amst. (2) ii, 1868, p. 33.
Distribution:—Waigiu.
Unfigured.
14. *rosenbergii* Bleeker, Nat. Tijds. Nederl. Ind., xii, 1857, p. 220.
Distribution:—East Coast of India to Nias.
Dimensions:—To 120 mm.
Figure:—Day, Fish. India, pl. lviii, fig. 5.
15. *soloensis* Bleeker, *ibid.*, v, 1853, p. 81.
Distribution:—Goram, Amboina, Solor.
Dimensions: To 83 mm.
Unfigured.
16. *versluysi* Weber, Siboga Fische, 1913, p. 261. Only known from the type.
Distribution:—Roma Island.
Dimensions:—136 mm.
Figure:—Weber, *ibid.*, text-fig. 65.
- iv. STALIX Jordan & Snyder, Proc. U. S. Nat. Mus., xxiv, 1902, p. 495 (*histrío*).
17. *histrío* Jordan & Snyder, *ibid.* Only known from the type.
Distribution:—Bay of Nagasaki, Japan.
Dimensions:—62 mm.
Figure:—Jordan & Snyder, *ibid.*, text-fig. 7.
- v. OWSTONIA Tanaka, Journ. Coll. Sci. Tokyo, xxiii, 1908, p. 47 (*totomiensis*).
18. *totomiensis* Tanaka, *ibid.*
Distribution:—Off the Province of Totomi, Japan. Only known from the type.
Dimensions:—500 mm.
Figure:—Tanaka, Fish. Japan, pl. viii, fig. 26.

NOTES ON THE BIOLOGY OF SOME QUEENSLAND FLIES.

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(With 48 Text-figures.)

DURING our experimental work with Diptera as possible transmitting agents of certain worm parasites of horses and stock¹ we used a number of species of flies found associated with these animals, some of them being either insufficiently described or apparently undescribed. We have already dealt with a few of these flies (Johnston and Bancroft, 1919) and now propose to give an account of certain others which, as far as available literature allows us to judge, belong to undescribed species of *Musca*.²

We desire to express our appreciation of the assistance given by Dr. E. W. Ferguson, Health Department, Sydney; Mr. W. W. Froggatt, Government Entomologist, Sydney; Dr. A. B. Walkom, Linnean Society, Sydney; and Mr. W. A. Rainbow, Australian Museum, Sydney. Typical specimens have been deposited in the Queensland Museum, Brisbane, and in the Australian Museum, Sydney.

MUSCA TERRÆ-REGINÆ n. sp.

(Text-figs. 1, 2, 9, 10, 15, 17, 18, 27, 28, 31, 37, 38, 41, 42, 43, 44, 45.)

This is a rather small fly about 4.5 mm. in length, which has been taken occasionally on stock in the Eidsvold district and is referred to in our previous paper (1919, p. 182) as *Musca* sp. indet.

MALE.

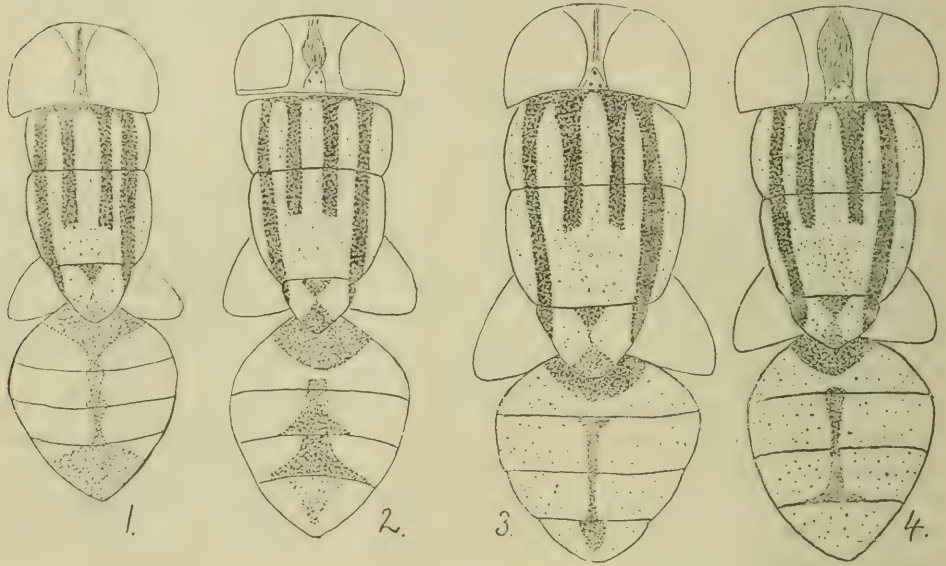
Head (fig. 9).—One is struck with the relatively enormous size of the eyes which occupy more than three quarters of the front of the head. They are separated from one another by a narrow frontal stripe bounded by numerous

¹ Johnston and Bancroft, The Life History of *Habronema* in relation to *Musca domestica* and native flies in Queensland, P.R.S. Q'land, 1920.

Johnston and Bancroft, Experiments with certain Diptera as possible transmitters of bovine *Onchocerciasis*, P.R.S. Q'land, 1920.

² Unfortunately for us Professor M. Bezzi's excellent key deals only with African and Mediterranean species of *Musca* (*Miodarii Superi* raccolti dal Sign. C. W. Howard nell' Africa australe orientale—Boll. Lab. zool. gen. agr. d. R. Scuola Sup. d'Agric. Portici, 6, 1912, Keys pp. 85-88).

rather short chaetae. The ocellar triangle is not very prominent and bears about four pairs of short ocellar bristles. Behind the triangle there is on each side a prominent vertical bristle, with a shorter one adjacent to it. The facial region is practically triangular in outline. The silvery parafrontals do not extend upwards between the eyes except as a thin black line on either side between the frontal stripe and each eye. The characters of the silvery-grey antennae are shewn in fig. 31.



Text-figs. 1-4.—*Camera lucida* drawings to show dorsal colouration. All figs. drawn to same scale. Fig. 1, *Musca terra-reginae* male; 2, *M. terra-reginae* female; 3, *M. hilli* male; 4, *M. hilli* female.

Thorax (fig. 1).—When viewed with the light falling from the front the thorax is black and shiny, but when viewed from the opposite quarter the general effect is dark greyish.³ There are four longitudinal stripes, the two outer extending backwards to the sides of the scutellum whilst the two inner extend only to the middle of the scutum. The central silver-grey stripe is rather broader and in individuals of either sex may extend much further forward than the others. The black stripes of each side fuse anteriorly. The posterior half of the midregion of the scutum is rather darker than the other portions. On the anterior part of the scutellum there is a prominent black marking followed by a well-defined smoky patch extending to the hind margin of the scutellum. The chaetotaxy is shewn in fig. 15.

³ The accompanying descriptions of the thorax and abdomen of each species are based on specimens with the head towards the observer and with the source of light opposite the observer.

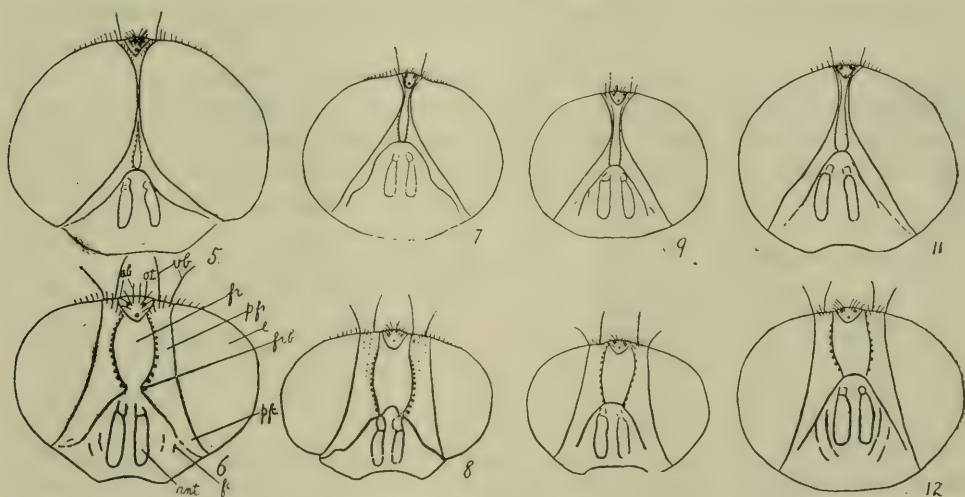
Wings.—The veins are yellowish brown. The venation is shewn in fig. 17. The squame is pale yellow.

Legs.—The tarsus of the third leg is figured in fig. 27.

Abdomen.—The abdomen is pale yellow with a median dorsal band, the intensity of whose colouration is interrupted in places so that there appears a succession of light-brown and dark-brown markings. The colouration extends to the anterior half of the first abdominal segment⁴ where it is rather dark brown. Laterally on each segment there is a patch of darker yellow (fig. 1).

FEMALE.

Head.—The main external difference between the male and female is in the size of the eyes which in the female are separated (where they most closely approximate) by about a third of the width of the head (fig. 10), whereas the minimum distance is about one twenty-fifth in the male. The silvery parafrontals extend upwards between the eyes as a fairly broad band separated by



Text-figs. 5-8.—*Camera lucida* outlines of face views drawn to same scale to show relationship of eyes, frons, etc. Fig. 5, *M. australis* male; 6, *M. australis* female; 7, *M. vetustissima* male; 8, *M. vetustissima* female; 9, *M. terræ-reginæ* male; 10, *M. terræ-reginæ* female; 11, *M. hilli* male; 12, *M. hilli* female. Lettering as in preceding figures—*ant.*, antenna; *e.*, eye; *fr.*, frons or frontal stripe; *fr.b.*, frontal bristles; *fc.*, facialia; *o.b.*, ocellar bristle; *o.t.*, ocellar triangle; *p.fc.*, parafacialia; *p.fr.*, parafrontalia; *v.b.*, vertical bristles.

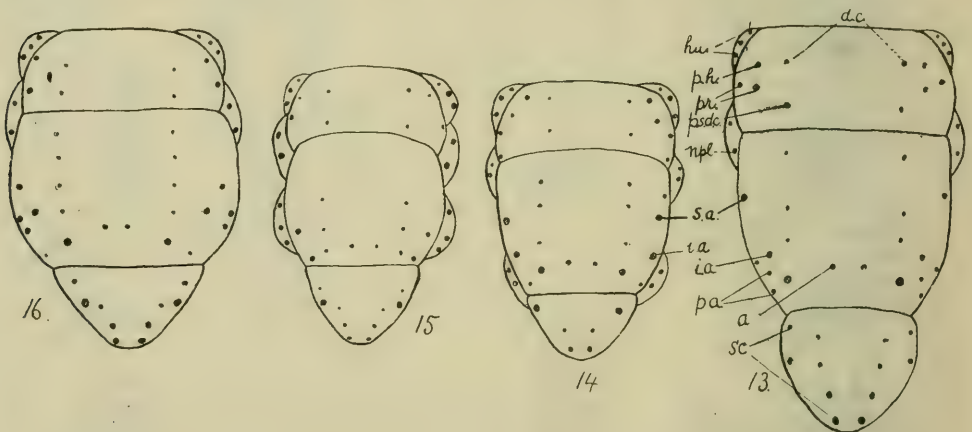
the very shallow smoky-coloured frontal stripe. There are two prominent vertical bristles on either side behind the eyes. The ocellar triangle does not project and the ocellar bristles are short.

⁴ The terms 1st to 4th are applied to the obvious abdominal segments—*i.e.*, the reduced first segment is not taken into account as a separate one but is considered as a part of the second with which it is fused, the two together being dealt with as the first segment.

Thorax.—The thorax is similar to that of the male (fig. 2). The form of the last tarsus is shown in fig. 28.

Wings.—As in the case of *M. hilli* there are slight differences in the sexes in regard to the wing, particularly in the region of the first posterior cell and the posterior cross-vein (fig. 18).

Abdomen (fig. 2).—The general colour is yellow with a brown median dorsal stripe, rather broad on the anterior portion of the first segment and more or less interrupted in the middle portion, but on the posterior region of that segment the colouration makes its reappearance extending on to the succeeding segment and widening to form a large dark-brown blotch of more or less triangular outline. A similar patch of colour occurs on the succeeding segment and is continued on to the fourth. Faint shimmering whitish patches occur laterally towards the posterior end of the abdomen. The under surface is yellow.



Text-fig. 13, Outlines of thorax (dorsal) to show chaetotaxy; *M. australis*; 14, *M. vetustissima*; 15, *M. terre-reginæ*; 16, *M. hilli*. Lettering—*a.*, acrostichal (inner dorso-central); *d.c.*, dorsocentral; *hu.*, humeral; *i.a.*, intra-alar; *npl.*, notopleural; *pa.*, postalar; *p.h.*, posthumeral; *pr.*, presutural; *p.s.d.c.*, presutural dorsocentral; *s.a.*, supra-alar; *sc.*, scutellar.

Breeding Habits.—The eggs are laid in cowdung or horsedung, each egg measuring about 1 mm. in length by .25 mm. in breadth, being very similar to that of the house-fly. In less than twenty-four hours the eggs hatch, the larvæ being in the first instar (fig. 42). Twenty-four hours later the first moult occurs; the anterior spiracles each with six or seven processes appear (fig. 45), while the posterior spiracles are in the form of two almost straight slits (fig. 43). The second instar also lasts about twenty-four hours. In the third instar the posterior spiracles take the form of three sinuous slits surrounded by a black chitinous D-shaped ring (fig. 44). The mature larvæ are creamy white and measure 9 to 10 mm. in length by 1.5 mm. in breadth. They leave the dung

and pupate in damp sand under laboratory conditions. The puparium is reddish brown and measures 4 to 5 mm. by 1.5 to 2 mm. The larval stage lasts from 5 to 7 days, and the pupal from 7 to 10 days, the total thus being from 12 to 17 days during midsummer (Eidsvold, Burnett River), which is similar to that of the house-fly.

In bred flies the males were usually slightly in excess of the females, about 51 per cent. being males and 49 per cent. females. When bred flies of both sexes were kept together in a small cage and fed on raisins, honey, &c., copulation was observed to take place in from 5 to 9 days after emergence (midsummer observations), while the females were ready to oviposit about five days later.

The female genitalia (fig. 41) closely resemble those of the house-fly, except that the number of ovarian follicles is less, the maximum number detected in each ovary being thirty-five.

Parasites.—*M. terra-reginæ* was found to be parasitised by a flagellate, *Herpetomonas* (probably *H. muscæ-domesticæ* Burnett), and by three larval nematodes (*Habronema muscæ* Carter, *H. megastoma* Rud, and *Agamospirura muscarum* Jnstn. and Baner.).

The following observation may be of interest as it allows one to compare the various periods taken by the three flies *M. terra-reginæ*, *M. vetustissima*, and *M. domestica* to pass through their larval stages in horsedung, since all were under similar conditions, being bred in material from the same source and collected at the same time (November, 1919, Eidsvold):—

—	<i>Musca terra-reginæ</i> .	<i>M. vetustissima</i> .	<i>M. domestica</i> .
Eggs deposited	November 13th	14th	14th
Hatched as first instar	November 14th	15th	15th
Second instar	November 15th	15th and 16th	16th
Third instar	November 16th, 17th	17th	17th
Mature larva	November 18th, 19th, and 20th	18th and 19th	20th and 21st
Larval stages	5 to 7 days	4 to 5 days	6 to 7 days
Emergence—			
25.11.9 .. .. .	.. .. .	2 males, 2 females .. .. .	.. .. .
26.11.9 .. .. .	.. .. .	2 males, 5 females .. .. .	.. .. .
27.11.9	2 males, 3 females	9 males, 2 females .. .. .	.. .. .
28.11.9	Few—both sexes .. .. .	.. .. .	.. .. .
29.11.9	Few—both sexes .. .. .	.. .. .	A few
30.11.9	1 male, several females .. .. .	.. .. .	A few
Pupal stage	8 to 11 days	7 to 9 days	9 to 10 days
Total period for larval stages (egg to imago) approximately	13 to 18 days	11 to 14 days	15 to 17 days

MUSCA HILLI n. sp.

(Text-figs. 3, 4, 11, 12, 16, 19, 20, 29, 30, 32, 39, 40, 46, 47, 48.)

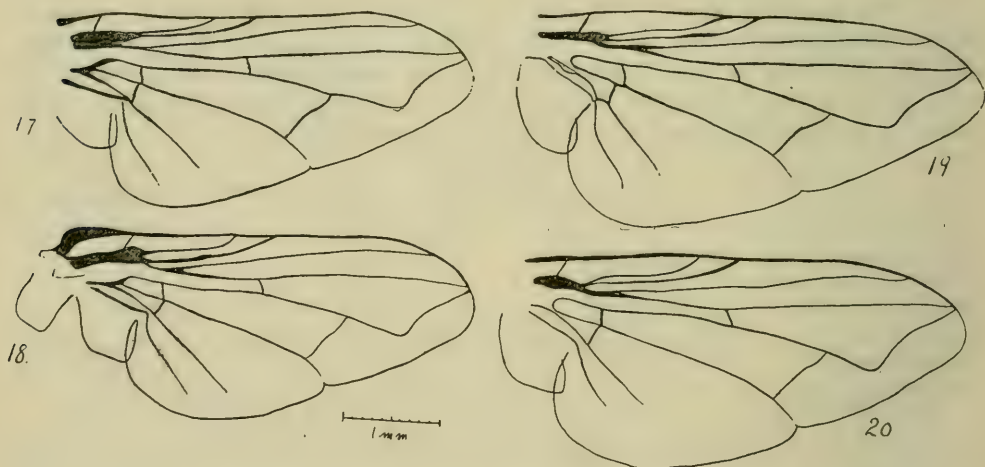
This is an outdoor species which is occasionally found on horses and cattle in Eidsvold and also in Brisbane. We have also seen it at Tweed Heads, N. S. Wales (March, 1920). The average length of full-grown specimens of either sex is about 6 mm.

MALE.

Head.—The eyes occupy the greater part of the front view and are contiguous for a considerable distance (fig. 11), separated only by a very narrow frontal stripe. The ocellar triangle is elongate and narrow, projects prominently, and bears about four pairs of ocellar bristles. The parafrontals are wide and silvery. The frontal stripe is narrow and brownish.

The antennæ are smoky in colour. The form of the arista is shewn in fig. 32. There are two prominent bristles, also a shorter third one, on the second joint of the antenna.

Thorax (fig. 3).—When lighted from the anterior end the general effect is black and shiny, but when viewed from the opposite quarter four distinct stripes are to be seen separated by narrow greyish zones. The outer stripes extend from the anterior portion of the thorax to the end of the scutum and on to the anterior corners of the scutellum. The two inner stripes extend from the anterior end of the prescutum to about the midregion of the scutum where they merge into a rather smoky colouration occupying the middle and posterior



Text-fig. 17, Wings drawn to same scale; *M. terræ-reginæ* male; 18, *M. terræ-reginæ* female; 19, *M. hilli* male; 20, *H. hilli* female.

part of the scutum between the longitudinal stripes. The four stripes are of approximately equal width and are each rather narrower than the central silvery stripe. The two dark stripes of each side are joined up by a black band anteriorly, somewhat as in *M. fergusoni*. The posterior end of the scutellum is smoky, this colouration becoming intensified so that at the anterior end the scutellum is practically black. The chaetotaxy is indicated in fig. 16. It might be mentioned that the scutellum is very hairy, the setæ being particularly well developed and the macrochaetæ quite long,

Wings.—The wings are clear, the veins yellowish brown. The venation.

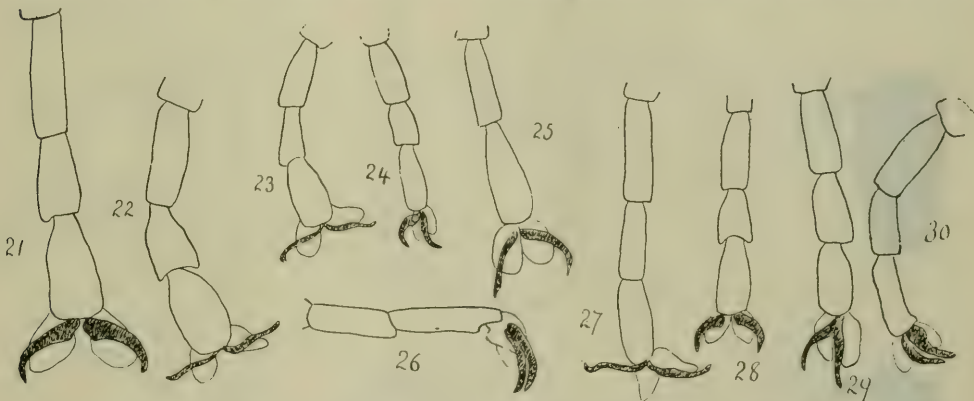
is indicated in fig. 19. To the naked eye the squame appears opaque and somewhat pearly.

Legs.—The characters of the tarsi of the third leg are shewn in fig. 29.

Abdomen (fig. 3).—The fly can be very readily distinguished from *M. vetustissima* and *M. fergusoni* by the pale-yellow abdomen in both sexes. There is dorsally a median narrow brownish stripe, interrupted in the middle of the first abdominal segment. It is more pronounced in some individuals than in others, being occasionally reduced to a brownish blotch on the posterior edge of each segment. Whitish reflections are visible posteriorly and postero-laterally. The abdomen is well provided with long chaetae. The ventral surface is pale yellow with brownish colouration in the vicinity of the genital aperture.

FEMALE.

Head (fig. 12).—The head of the female differs from that of the male in the following particulars:—The eyes are widely separated, the distance between them, where they approach most nearly, being about a third of the total width



Text-fig. 21, Tarsi of third leg—final segments only—all drawn to same scale, *M. australis* male; 22, *M. australis* female; 23, *M. vetustissima* male; 24, *M. vetustissima* female; 25, *M. domestica* male (for comparison); 26, *M. domestica* female; 27, *M. terræ-reginæ* male; 28, *M. terræ-reginæ* female; 29, *M. hilli* male; 30, *M. hilli* female.

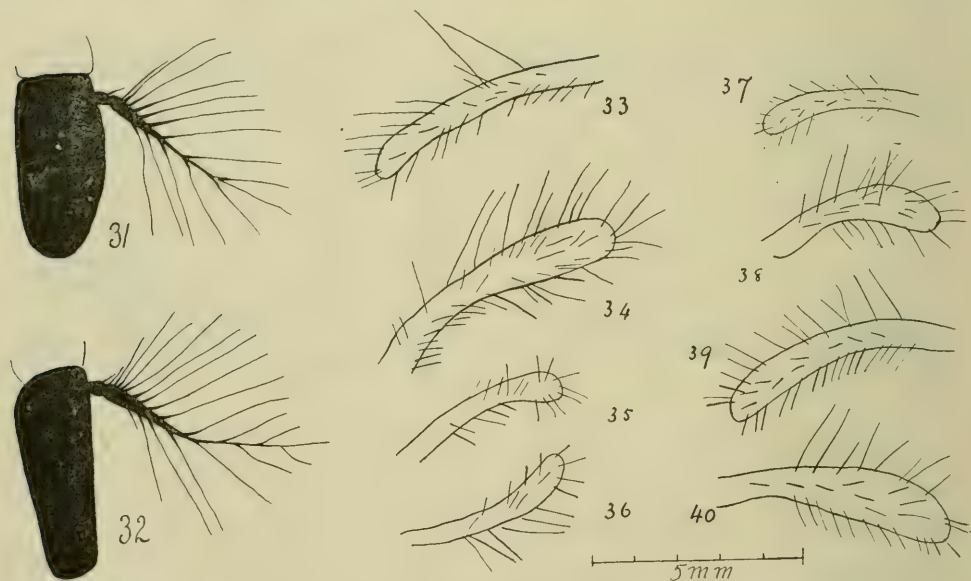
of the head, whereas in the case of the male it is about one thirtieth. There is a broad shallow dusky frontal stripe bounded by strongly incurving fronto-orbital bristles. On each side of the stripe is a fairly wide parafrontal which, as in the case of the male, is silvery.

Thorax (fig. 4).—The female thorax has much the same characters as the male.

Wing.—The wing (fig. 20) differs from that of the male in the shape of the first posterior cell (fifth radial) and also in the form of the elbow of the fourth longitudinal vein ($M. 1 + 2$) and its relation to the posterior cross-vein (mediocubital).

Abdomen (fig. 4).—When viewed from certain points the abdomen appears to possess shimmering white patches, this being of course due to the arrangement of the tiny hairs. Ventrally the colour is pale yellow, there being only a faint brownish tint around the genital opening.

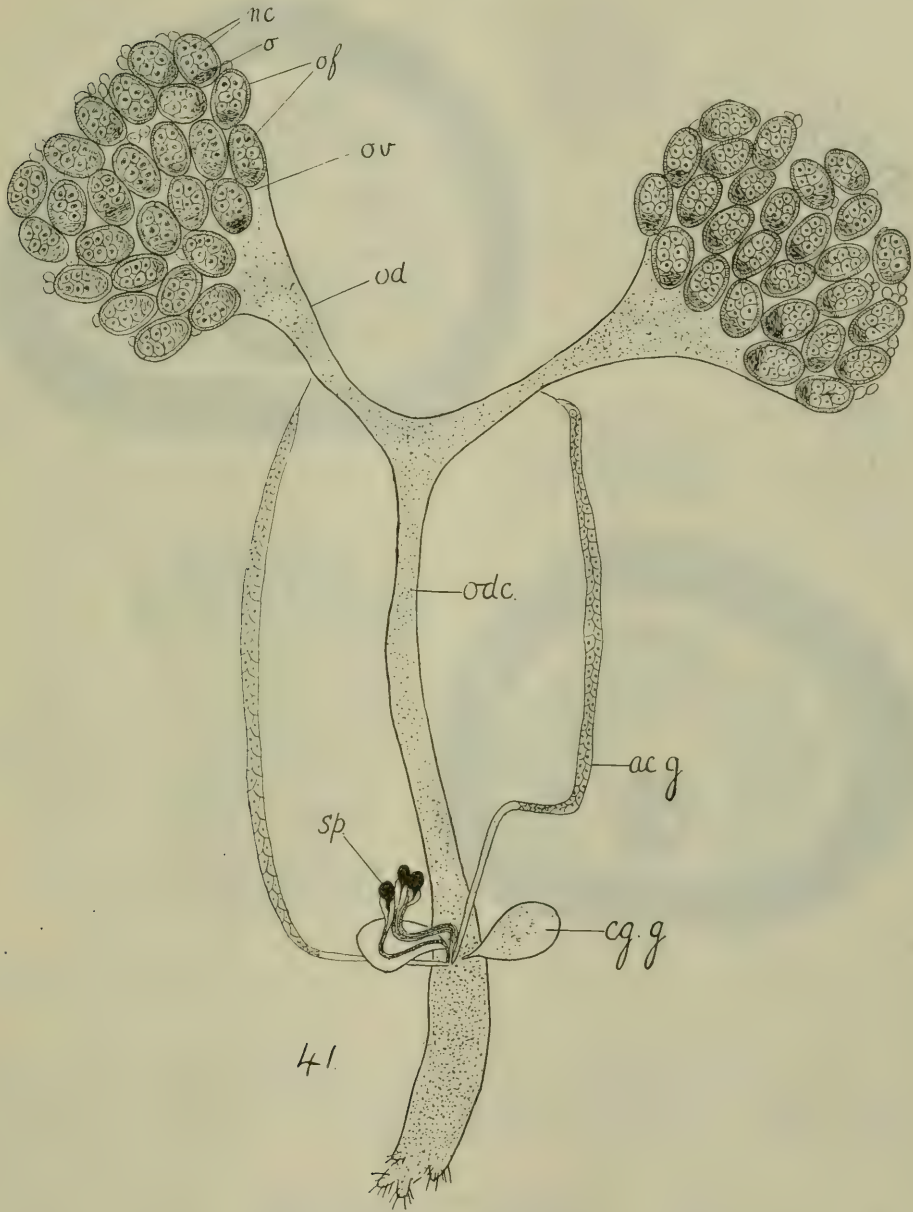
Breeding Habits.—The breeding habits of this fly resemble those of the preceding species, the small white eggs, which measure approximately the same as those of *M. terra-reginæ*, being laid in cowdung or horsedung. The successive instars occupy about the same periods. The posterior spiracles of the second and third instars are quite typical (figs. 46, 47). The anterior spiracles contain from 4 to 7 processes (fig. 48). The mature larva measures from 10 to 12 mm. The larval stage occupies from 5 to 6 days, the pupal 6 to 9 days—a total of 11 to 15 days (January and February, Eidsvold and Brisbane). The puparium is red-brown to deep chocolate and measures about 6 mm. in length by 2.7 mm. in breadth. The female genitalia are very like those of the preceding species (fig. 41), the maximum number of follicles observed in each ovary being, however, slightly larger, viz., about 40.



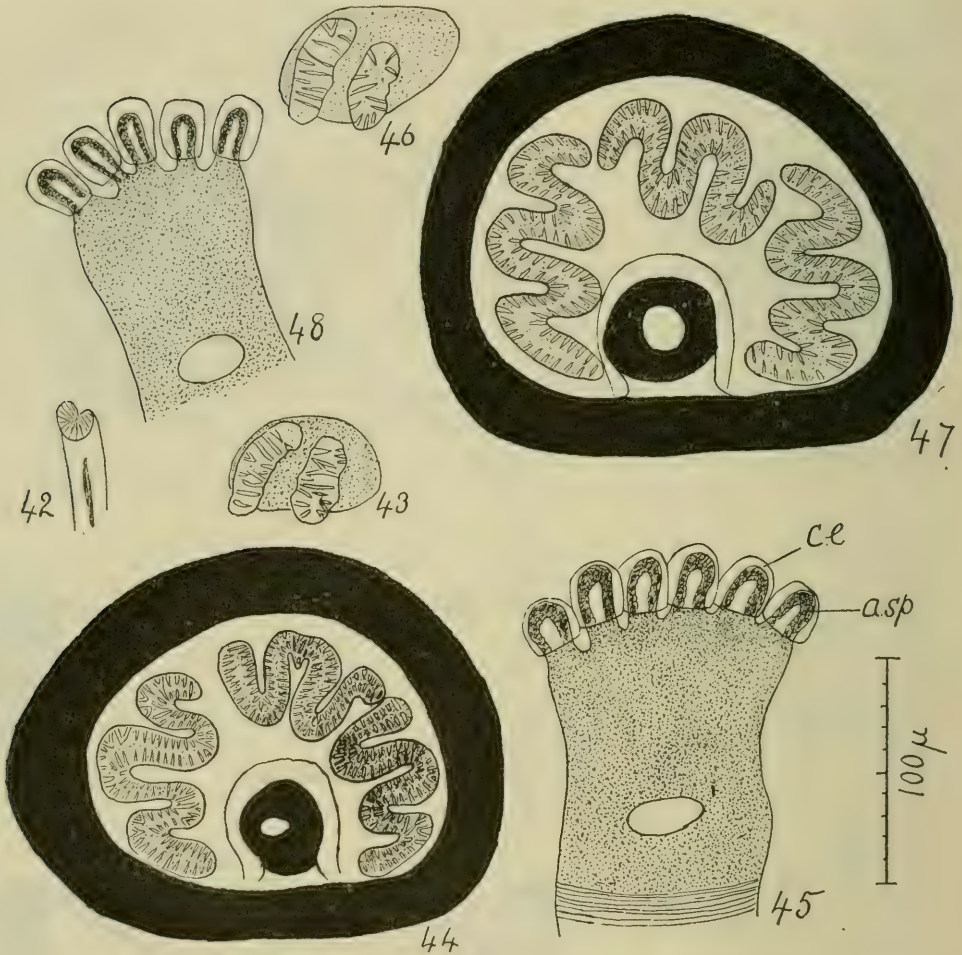
Text-fig. 31, Aristæ of females, *M. terra-reginæ*; 32, *M. hilli*.

Text-fig. 32, Palps (all to same scale) drawn from mounted specimens, *M. australis* male (fig. 33) and female (34); *M. vetustissima* male (fig. 35) and female (fig. 36); *M. terra-reginæ* male (fig. 37) and female (fig. 38); *M. hilli* male (fig. 39) and female (fig. 40).

The fly can be readily distinguished from *Musca pumila* by the colouration of its abdomen (Macquart, Dipt. Exot. Suppl. 3, 1847, p. 58). It appears to be more closely related to *Musca minor* (Macquart, l.c. Suppl. 4, 1850, p. 253).



Text-fig. 41, Genitalia of female *M. terræ-reginæ*. Lettering: *ac.g.*, accessory gland; *c.g.g.*, conglobate gland; *n.c.*, nurse cells; *o.*, ovum; *od.*, oviduct; *od.c.*, common oviduct; *o.f.*, ovarian follicles; *ov.*, ovary; *sp.*, spermatheca.



Text-figs. 42-44, Larval spiracles, all drawn to same scale. Posterior spiracles of *M. terræ-reginæ*; first instar (42), second instar (43), third instar (44).

Text-fig. 45, Anterior spiracle of third instar of *M. terræ-reginæ*.

Text-figs. 46-48, Spiracles of larva of *M. hilli*: fig. 46, posterior spiracle of second instar; 47, posterior spiracle of third instar; 48, anterior spiracle of third instar. *a.sp.*, anterior spiracular process, surrounded by a clear envelope (*c.e.*).

from Tasmania, but in view of the brevity of the description, particularly in regard to the thoracic and abdominal markings, we do not feel justified in identifying our form with his. We have pleasure in associating with this new species the name of Mr. G. F. Hill, Entomologist to the Australian Institute of Tropical Medicine, Townsville, North Queensland, who has published important papers dealing with Australian flies.

Parasites.—*M. hilli* readily becomes parasitised by the nematodes *Habronema muscæ* and *H. megastoma*.

EUMUSCA VETUSTISSIMA (Walker).

(Text-figs. 7, 8, 14, 23, 24, 35, 36.)

Townsend (1915) stated that the type of the genus *Musca*—so designated by Latreille—is *M. vomitoria* L., a blowfly which was transferred to *Calliphora*; and that the latter generic name fell into synonymy, a new name being required for the species usually placed under *Musca*. He accordingly erected the genus *Promusca* (p. 434) with *M. domestica* L. as its genotype. He had previously (1911, p. 170) separated off certain species making *M. corvina* Fabr. the type of *Eumusca*.

The characters of *Musca vetustissima*, which have already been described by us (J. and B., 1919), agree with most of those given by Townsend (1915, p. 435) but differ in certain important respects—*c.g.*, (1) the eggs, though macrotype, are not stalked; (2) the puparium is red-brown like that of the house-fly; and (3) copulatory vesicles are present in the female. The species thus occupies a position between *Promusca* and *Eumusca*, more nearly approaching the latter genus of which it may perhaps be regarded as an atypical member, otherwise a new genus would need to be erected for its reception.

In our previous account we did not refer to the chaetotaxy which is now figured (fig. 14). There are two weak dorsocentrals on either side in front of the suture. The presutural and posthumeral are rather strongly developed. Postsuturally there are four dorsocentrals, only the last being strong. Three pairs of scutellar macrochaetae are present, two pairs being well developed. The vertical bristles behind the eyes are arranged as in *Musca domestica*.

The palp of the two sexes are shown in figs. 35 and 36 and the tarsus of the third leg in figs. 23 and 24.

In our earlier account (1919, fig. 5) we omitted to indicate in our figure that the fourth abdominal segment (*i.e.* true fifth) of the male possessed a dark colouration.

Dr. Cumpston, Director of the Federal Quarantine Service, informed us that he had observed the common Western Australian bush-fly (*M. vetustissima*) copulating thirty-six hours after emergence. He used a rather large cage measuring about 6 by 6 by 8 feet for his observations.

VIVIPAROMUSCA FERGUSONI J. and B.

(Text-figs. 5, 6, 13, 21, 22, 33, 34.)

This species was described last year (J. and B.) as *Musca fergusonii*. If Townsend's genus *Viviparomusca* (1915, p. 435) be recognised then the relationships of this Northern Australian fly are rather with it than with *Promusca*.

(*Musca* of authors). It differs, however, in several important points, viz.—(1) the larva is carried in the uterus to the *second* stage, not the third; (2) copulatory vesicles are present in addition to the accessory glands in the female. In regard to (1) we might point out that the two posterior spiracular slits of this instar are not straight but sinuous as they are in those of the third instar where there are three. Then again in the type species of the genus *M. bezzii* Patton, a larva is deposited, though in which stage mention is not made by Patton and Cragg (1913, p. 23). In *M. fergusonii* the larva is deposited while in an eggshell which at once bursts liberating it.

This fly appears to be very hairy on account of the presence of well-developed macrochaetae on the dorsal part of the thorax. Many of the scutellar bristles are very strong and are practically macrochaetae. The arrangement is shown in fig. 13. The vertical pairs between the eyes are strong. The ocellar bristles are weakly developed in both sexes, especially in the male where they are practically absent.

The form of the tarsi and claws of the third leg in the two sexes is shown in figs. 21 and 22. The palps bear very strong setae in both sexes, especially in the male (figs. 33, 34).

OTHER FLIES.

In our earlier paper (1919, p. 182) we referred to the presence of certain other flies in the Eidsvold district. The cobalt-blue species therein indicated as *Lasiopyrellia* is a *Pseudopyrellia*, according to Williston's Key to the North American genera (1908), while the very small fly which was regarded as being probably a *Pseudopyrellia* falls within the genus *Pyrellia*. It was mentioned that both of these metallic flies frequented cowdung for oviposition. So also does a rather handsome large blowfly which Mr. W. W. Froggatt has identified for us as *Stenopterina gigas* Macq. A tiny species of *Sepsis* is very commonly found frequenting similar material and breeds in it. Patton and Cragg (1913b, p. 310) refer to its presence in India.

Muscina stabulans has been bred out of rotting potatoes received at Eidsvold from elsewhere and no doubt the fly is occasionally to be met with in the township.

Amongst the Anthomyidæ occurring there one might mention that *Phaonia personata* Walker, which at first sight somewhat resembles a large greyish or bluish long-winged house-fly, is to be found in the vicinity of rotting fruit and has been bred out from that material.⁵ Mr. Froggatt (1907, p. 311) who kindly identified the species and also the one next mentioned, informed us that it occurred commonly in fruit-shops in Sydney. *Sapromyza fuscicornis* Macq., a fairly large fly (Sapromyzidæ) with a striped thorax and a dark head, has been bred from horsedung (Eidsvold).

⁵ See also W. B. Gurney. Fruit-flies and other insects attacking cultivated and wild fruits in N. S. Wales—Farmers' Bulletin, No. 55, July, 1912, Dept. Agric. N. S. Wales, p. 29; and in Agric. Gaz. N. S. Wales, January 1912 (pp. 75-80).

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THE OCCURRENCE IN BRISBANE RIVER OF THE NEW ZEALAND AMPHIPOD, *PARACOROPHIUM EXCAVATUM* (G. M. THOMSON).

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(With Text-figures Nos. I to XIX.)

TOWARDS the end of 1918, I received from Professor T. Harvey Johnston, of the University of Queensland, and honorary Zoologist to the Queensland Museum, a few Crustacea from Brisbane River, sent chiefly because of the boring Isopod, *Spharoma terebrans* Bate, which was doing considerable destruction in timber immersed in the water. Among the specimens, however, were numerous examples of a small amphipod evidently belonging to *Corophium* or some allied genus. The male of this species first attracted my attention because of the character of the second gnathopod and the possession of a lobe on the inner side of the end of the penultimate joint of the peduncle of the lower antenna. Later on when I came to examine the females, which differed in the structure of the second gnathopod and in having no lobe on the antenna, I was struck by their resemblance to the descriptions of *Paracorophium excavatum* (G. M. Thomson), an amphipod found in brackish waters of New Zealand. In that species no sexual differences had hitherto been described. However, I found on closely examining specimens in my collection that there were some males among them having the characters of the second gnathopod and the lobe on the lower antenna quite similar to those of the Brisbane specimens, and careful comparison shows conclusively that the Brisbane specimens belong to the same species as the New Zealand. I take this opportunity of giving a fuller account of the species than has hitherto been published and of describing the differences between the male and the female.

Paracorophium excavatum was described by Mr. G. M. Thomson in 1884, under the name *Corophium excavatum*, from specimens obtained in Brighton Creek, near Dunedin, the water of which he described as being salt. A little later I received some specimens from Napier, and in January, 1890, I collected a number at Brighton itself at a time when the water in the estuary was nearly fresh or only slightly brackish; in 1894 I obtained a few specimens from Nelson, also in brackish water. In 1902 Messrs. Lucas¹ and Hodgkin obtained specimens

¹ Keith Lucas, A Bathymetrical Survey of the Lakes of New Zealand, Geographical Journal for May and June, 1904.

from Lake Roto-iti (fresh water) in Auckland which I afterwards identified as belonging to the same species.² The Brisbane specimens now to be described also come from brackish water, and the occurrence of this species, which is apparently confined to brackish and fresh waters, in Australia as well as in New Zealand, is of some importance in connection with the general question of the geographical distribution of New Zealand and Australian Amphipoda.³

In 1899 Stebbing established the genus *Paracorophium* for the reception of the species now under consideration, which is the only one of the genus at present known.

PARACOROPHIUM Stebbing, 1899.

Paracorophium Stebbing, 1899, Ann. Nat. Hist., ser. 7, vol. 3, p. 350; 1906, Das Tierreich: Amphipoda, p. 663.

In general appearance and in most of the appendages *Paracorophium* comes close to *Corophium*, the chief points of difference being—(1) The mandible has the palp well developed and three-jointed, (2) the second gnathopod of the male is markedly different from that of the female and in both sexes has the merus produced into a scoop-like process different from that in *Corophium*, (3) the third uropoda are two-branched.

PARACOROPHIUM EXCAVATUM (G. M. Thomson).

Corophium excavatum G. M. Thomson, 1884, Trans. N. Z. Inst., vol. 16, p. 236, pl. 12, fig. 1 to 8.

Paracorophium excavatum, Stebbing, 1906, Das Tierreich Amphipoda, p. 664.

Paracorophium excavatum, Chilton, 1906, P.Z.S., p. 704.

As this is the only species of the genus it is unnecessary to give a separate specific diagnosis. Thomson's original description and figures, on which that in Das Tierreich Amphipoda appears to be based, apply to an immature male. A detailed description is given below.

Size.—About 4 mm. in length.

Colour.—Greyish.

Localities.—New Zealand—Brighton, Napier, Nelson (brackish water), and Lake Roto-iti (fresh water); Australia—Brisbane River (brackish).

Antenna 1 (fig. 1) has the second joint of the peduncle longer than the first but much more slender; the third about half the length of the second;

² P.Z.S. 1906, p. 704.

³ Several of the Corophiidae appear to be able to live in brackish or fresh water. Speaking of the whole family Stebbing says (1906, p. 662), "Marine, but extending into brackish or even almost fresh water"; and of *Corophium crassicorne* Bruz. he says, "Found in Norfolk in almost fresh water." *C. volutator* is recorded as "forming tubular galleries in the mud of tidal swamps." I have specimens of this species obtained for me by Mrs. Sexton, of Plymouth, labelled "Mouth of Issel, near Kampen. Quite fresh water"; and Mr. Robert Gurney, speaking of this species under the name "*C. grossipes* (Linn.)," says "it seems to thrive well in fresh water" (Trans. Norfolk and Norwich Naturalists' Soc., vol. viii, p. 435, 1907). Later on he recorded it as found in the Oued Tindja at its outflow from Lake Garaa Achkel in Tunisia (Jour. Roy. Micr. Soc. 1909, p. 283).

flagellum shorter than the peduncle, containing about 10 joints. This appendage appears to be the same in the male and in the female.

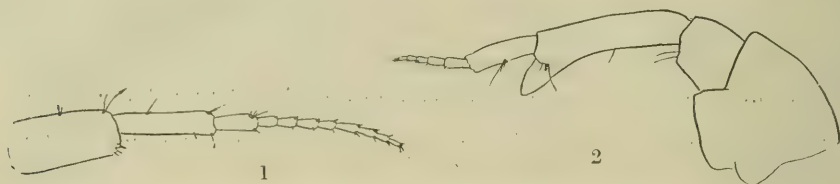


Fig. 1.—First antenna of male (Brisbane specimen).

Fig. 2.—Second antenna of male (Brisbane specimen).

Antenna 2 appears to vary considerably according to age and development, becoming stouter, especially at the base, in older specimens. In a fully developed male (fig. 2) the first three basal joints of the peduncle are short and very broad; the fourth joint is fully as long as all the preceding though much more slender, and is produced at the apex on the inner side into an oval lobe which when fully developed reaches nearly halfway along the fifth joint of the peduncle; the fifth is only half as long as the preceding; the flagellum is shorter than the last joint of the peduncle and consists of about 5 or 6 joints. The lobe at the end of the fourth joint of the peduncle varies in size in different specimens according to their development; in one specimen from Brighton, the second gnathopod of which is shown in figure 10*a*, the antennal lobe is quite short, the basal joints of the peduncle are not so broad and the fourth joint scarcely so long as in more mature specimens (fig. 2*a*). In a specimen from Lake Roto-iti which, judging by the second gnathopod, is an undeveloped male, the second antenna (fig. 2*b*)

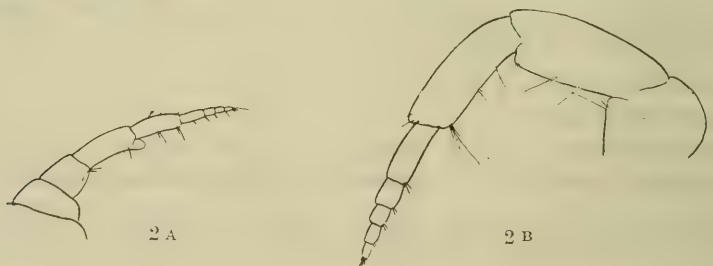


Fig. 2*a*.—Second antenna of male, immature (Brighton specimen).

Fig. 2*b*.—Second antenna of male, immature (Roto-iti specimen).

is very stout, the fourth joint being almost as stout as the preceding but without any trace of the apical lobe, while the fifth joint is larger in proportion than in the mature males from Brighton and from Brisbane. In some of the specimens the proximal joints of the flagellum appear to be partially fused though the line of junction is clearly visible; like the peduncle they bear a few fine setae. In the females the second antenna remains much more slender and without the lobe on the fourth joint.

The antennal lobe being found only in the male probably has some sexual function, but being flat on the inner side it perhaps also facilitates the holding together of the right and left antennae as the animal swims backwards.

The *mandible* (fig. 3) is of normal structure with large molar tubercle, the cutting edge consisting in the left mandible (fig. 3) of 3 or 4 teeth, the accessory process being similar and of approximately the same size; the spine row contains about 5 spines. In the right mandible (fig. 4) the accessory process is narrower. The palp is large, second joint the longest with a small tuft of setae at the distal end, third joint widens distally and bears numerous long setae at the apex with a small tuft at a little distance from the apex which is obliquely truncate.

The *first maxilla* (fig. 5) has the inner lobe very small and delicate, triangular, and bearing a minute setule at the end. The outer lobe ends in about 7 to 9 dentate spines; the palp has the first joint slightly swollen, the second joint widens distally and bears at the apex 7 or 8 short setules.

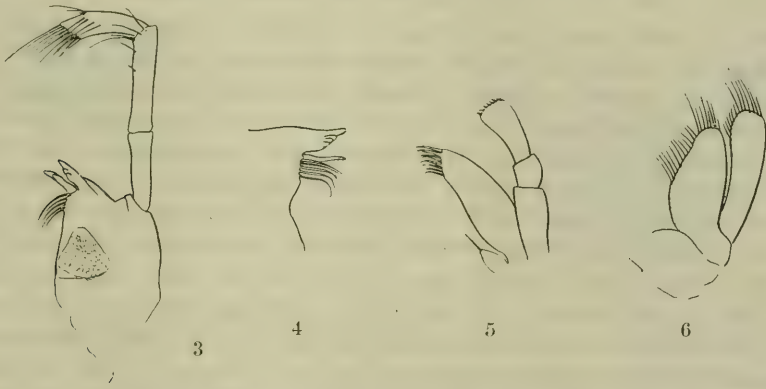


Fig. 3.—Left mandible, male (Roto-iti specimen).

Fig. 4.—Cutting edge of right mandible, male (Roto-iti specimen).

Fig. 5.—First maxilla, male (Roto-iti specimen).

Fig. 6.—Second maxilla, male (Roto-iti specimen).

The *second maxilla* (fig. 6) has the inner lobe shorter and broader than the outer and is fringed along its inner margin as well as at the rounded apex, in the outer lobe the long setae are mainly confined to the apex.

The *maxillipeds* (fig. 7) have the inner lobe bearing at the apex 4 long setae and several shorter ones, the outer lobe is somewhat narrow and reaches nearly to the end of the second joint of the palp, the inner margin is thickly fringed with setae. In the palp the second joint is much the longest; the propod is oval, produced at the outer apex slightly beyond the base of the finger; the finger is about half as long as the propod; all the joints bear long setules as shown in the figure.

The *first gnathopod* (figs. 8 and 9) has the side plate large and subtriangular, projecting forwards, its anterior angle rounded and bearing a fringe of long setæ which extends also along the lower margin; the basal joint widens considerably distally and bears a few long setæ towards the apex; the ischium



Fig. 7.—Maxilliped, male (Roto-iti specimen).

Fig. 8.—First gnathopod, male (Brisbane specimen).

Fig. 9.—First gnathopod, female (Brisbane specimen).

and merus are both short, their posterior margins bearing long setæ, those on the ischium reaching nearly to the middle of the carpus; the carpus is greatly elongated, being narrowly oblong in shape, its posterior margin densely fringed with a double row of long setæ, a few scattered ones being also found on the anterior margin; the propod is much shorter than the carpus, about the same width throughout, its palm nearly transverse, not defined, being closely overlapped by the dactyl; near the base of the propod is an oblique row or tuft of about 6 or 7 long setæ. This appendage seems to be the same in both sexes.

The *second gnathopod* in the fully developed male (fig. 10) is much stouter than in the female, the side plate is oblong with the inferior angles rounded, its inferior margin with a few long setæ; the merus is produced into a long scoop-like process reaching considerably beyond the end of the carpus which, together with the basal portion of the propod, appears to fit into the hollow of the scoop, one margin of which is fringed with very long setæ most of which

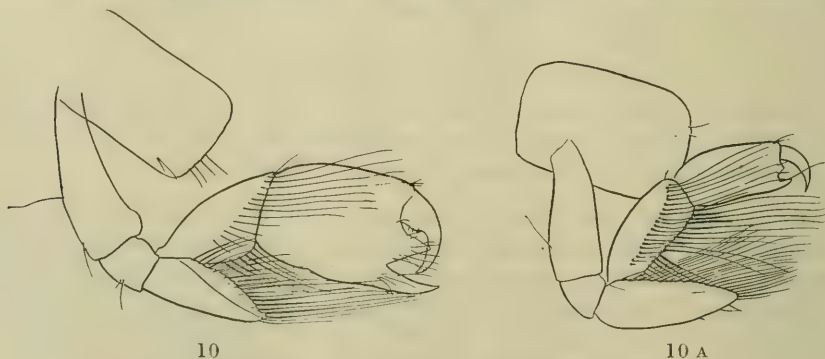


Fig. 10.—Second gnathopod, male (Brisbane specimen).

Fig. 10a.—Second gnathopod, male, immature (Brighton specimen).

reach quite to the end of the propod, the other (inner) margin being apparently free from setæ; the carpus is short, triangular in shape, widening greatly distally, its posterior border bears long hairs and there is an oblique row on the outer surface; the propod is oblong-oval, as wide at the base as the carpus, but becoming slightly wider distally; both anterior and posterior margins are convex, the posterior one being produced into a long slender curved tooth, separated by a deep depression from a similar but shorter tooth arising from the middle of the palm; the finger is short, not reaching quite to the end of the palm.

In the female the *second gnathopod* (fig. 11) has the scoop-like process on the merus as in the male, but differs greatly in the carpus and propod, both of which are much longer and more slender, as shown in the figure; the carpus is longer than the propod and has the posterior margin fringed with two widely separated rows of long setæ; the propod is slender and ends simply, being almost entirely without palm. In some cases the end of the propod is narrower than is shown in figure 11.

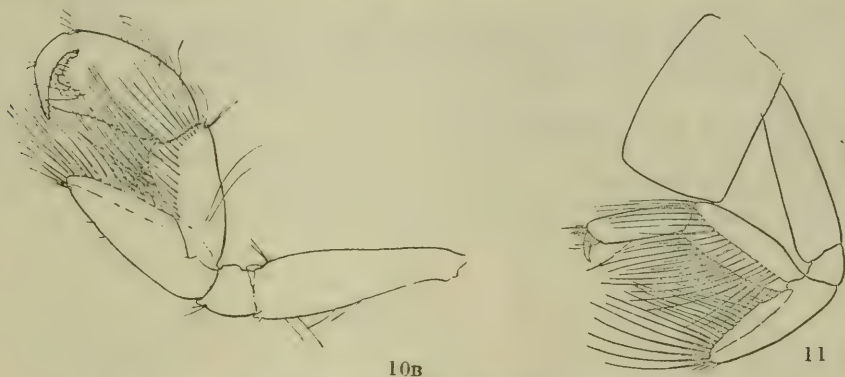


Fig. 10b.—Second gnathopod, male, immature (Roto-iti specimen).

Fig. 11.—Second gnathopod, female (Brisbane specimen).

In the young male the second gnathopod appears to be at first similar to that of the female, the adult male characters being gradually developed. Figure 10b shows an intermediate stage in which the carpus and propod, though broader than in the female, are still somewhat narrow; the propod has the posterior margin produced into a tooth only half the length it afterwards becomes, while the tooth in the centre of the palm is hardly yet apparent; the dactyl reaches slightly beyond the end of the palm in this case. This figure is drawn from a Lake Roto-iti specimen. I have a similar one mounted from Brighton (fig. 10a) in which the defining tooth of the palm is still shorter and the finger overlaps the palm as it does in the female.

The *first* (fig. 12) and *second peræopoda* are of normal shape and do not call for special description.

In the *third peræopod* (fig. 13) of fully developed animals the basal joint is very large and much produced posteriorly, the posterior margin being fringed with long setæ. The carpus bears at its postero-distal angle 4 strong curved

spines with a similar tuft of 3 placed more proximally. Similar curved spines are found also on the propod and appear quite similar to those in several species of *Corophium*. In more immature specimens the basal joint is much narrower

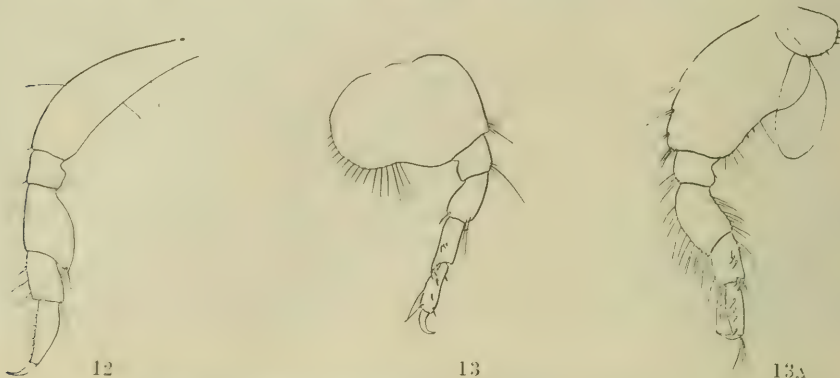


Fig. 12.—First peræopod, male (Brisbane specimen).

Fig. 13.—Third peræopod, male (Brisbane specimen).

Fig. 13a.—Third peræopod, male, immature (Roto-iti specimen).

and only slightly produced posteriorly. That of the Roto-iti specimen whose second gnathopod is shown in figure 10*b* is represented in figure 13*a*. The third peræopod of an ovigerous female from Brisbane River is represented in fig. 14, which shows that it is very nearly the same as in the adult male.

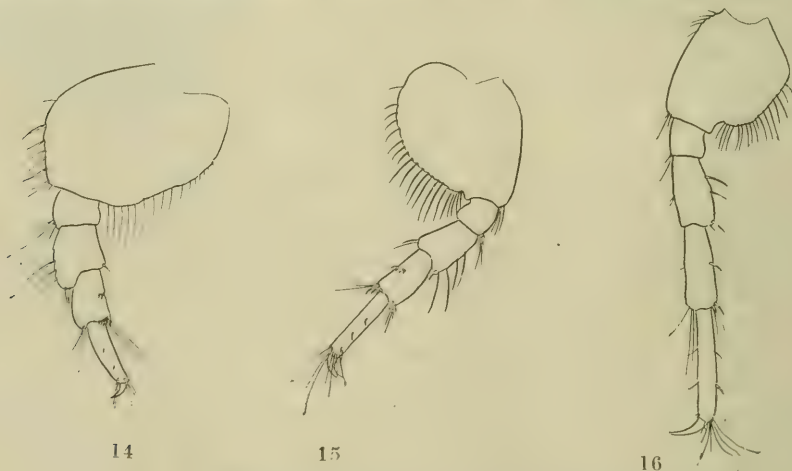


Fig. 14.—Third peræopod, female (Brisbane specimen).

Fig. 15.—Fourth peræopod, male (Brisbane specimen).

Fig. 16.—Fifth peræopod, male (Brisbane specimen).

The *fourth peræopod* (fig. 15) is longer than the third, and has the basal joint broad but less produced posteriorly than in the third, its posterior margin fringed with long spinules; strong curved spines are found on the carpus and propod as in the third peræopod.

The *fifth pereopod* (fig. 16) is longer than the fourth, the basal joint is somewhat narrower, the merus, carpus and propod longer; the various joints bear stout setæ and some long hairs, but not the special groups of curved spines that are present in the third and fourth.

The *first uropod* (fig. 17 and 17a) has the peduncle considerably longer than the rami, its lower margin being produced between them into a flattened process, which when fully developed reaches nearly halfway to the end of the rami; this is shown in side-view in figure 17; in figure 17a it is shown as seen from above with a broadish base and the extremity forming a narrow vertical knife-edge; numerous short spines are present on the upper margins of the peduncle and of the rami.

The *second uropod* (fig. 18) is shorter, the outer ramus shorter than the inner, both rami and the peduncle bearing a few short stout spines on the upper margin.

The *third uropod* (fig. 19) has the outer ramus about twice as long as the inner, which bears a sharp spine on its inner margin and three long hairs at the apex; similar long hairs are found at the end of the outer ramus and at the end of the peduncle.

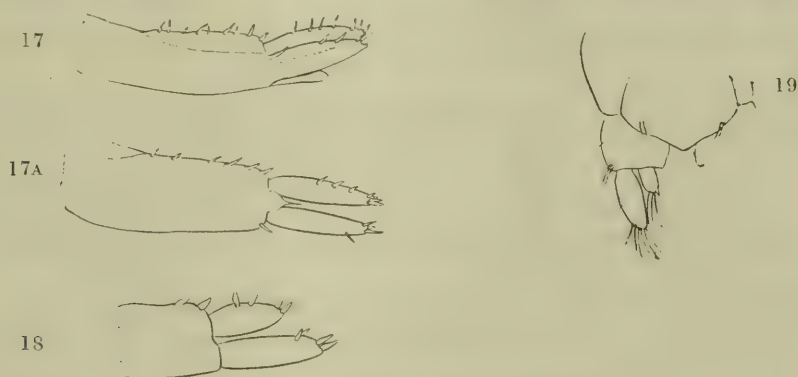


Fig. 17.—First uropod, male (Roto-iti specimen).

Fig. 17a.—First uropod, female (Roto-iti specimen).

Fig. 18.—Second uropod, female (Roto-iti specimen).

Fig. 19.—Third uropod and telson, female (Roto-iti specimen).

The *telson* (see fig. 19) has the posterior margin somewhat produced to a blunt triangular point, a pair of spinules being situated at each side at some distance from the extremity.

The specimens from Lake Roto-iti are larger than those from Brighton and Brisbane River and, as stated above, they differ in a few points, *e.g.* in the second antennæ of the male. It is possible that they may constitute a distinct variety, but I have not found among them a male as fully developed as those examined from the other localities, and in the meantime I consider the differences as being due to immaturity. In any case the differences are slight and do not seem to be of specific importance.

NEW OR LITTLE-KNOWN CRANE-FLIES IN THE QUEENSLAND MUSEUM (TIPULIDÆ, DIPTERA).

BY CHARLES P. ALEXANDER, PH.D., URBANA, ILLINOIS, U.S.A.

THROUGH the kindness of the Director, Mr. Heber A. Longman, the writer has been enabled to study the collections of crane-flies made in the vicinity of Brisbane by the Entomologist of the Queensland Museum, Mr. Henry Hacker. These collections, though not extensive, include many species of such interest that a special report is deemed necessary.

The types, which are preserved in alcohol, are returned to the Queensland Museum.

At this time, it is well to designate the genotypes of the numerous new genera of Australian crane-flies, proposed in 1889 and 1890 by Skuse:—

Triphana Skuse (subgenus of *Geranomyia*); Proc. Linn. Soc. New South Wales, vol. 4 (ser. 2), p. 777; 1889. Two species. Type, *Geranomyia* (*Triphana*) *lutulenta* Skuse, the first species, by present designation.

Tetraphana Skuse (subgenus of *Geranomyia*); i.e., pp. 780, 781. One species. Type, *Geranomyia* (*Tetraphana*) *fusca* Skuse, by monotypy.

Leiponeura Skuse (subgenus of *Gonomyia*); i.e., pp. 795, 796. Two species. Type, *Gonomyia* (*Leiponeura*) *skusei* Alexander (*gracilis* Skuse, preoccupied); the first species by designation of Alexander, Proc. U.S. Nat. Mus., vol. 44, p. 503; 1913.

Amphineurus Skuse (subgenus of *Ormosia*); i.e., pp. 800, 801. Two species. Type, *Ormosia* (*Amphineurus*) *umbratica* Skuse, the first species, by present designation.

Tasiocera Skuse; i.e., pp. 815, 816. Two species. Type, *Tasiocera tenuicornis* Skuse, the first species, by present designation.

Rhabdomastix Skuse; i.e., pp. 828, 829. One species. Type, *Rhabdomastix osten-sackeni* Skuse, by monotypy.

Lechria Skuse; i.e., pp. 830, 831. One species. Type, *Lechria singularis* Skuse, by monotypy.

- Clytocosmus* Skuse; Proc. Linn. Soc. New South Wales, vol. 5 (ser. 2), pp. 74-76; 1890. One species. Type, *Clytocosmus helmsi* Skuse, by monotypy.
- Platyphasia* Skuse; l.c., pp. 84, 85. One species. Type, *Platyphasia princeps* Skuse, by monotypy.
- Plusiomyia* Skuse; l.c., pp. 86, 87. Five species. Type, *Plusiomyia olliffi* Skuse, the second species, by present designation.
- Habromastix* Skuse; l.c., pp. 93, 94. Three species. Type, *Habromastix cinerascens* Skuse, the first species, by present designation.
- Phymatopsis* Skuse; l.c., pp. 97, 98. One species. Type, *Phymatopsis nigrirostris* Skuse, by monotypy.
- Acracantha* Skuse; l.c., pp. 109-111. Three species. Type, *Acracantha sydneyensis* Skuse, the first species, by present designation.
- Ischnotoma* Skuse; l.c., pp. 114, 115. Three species. Type, *Ischnotoma serricornis* Macquart, the first species, by present designation.

FAMILY TIPULIDÆ.

SUBFAMILY LIMNOBIINÆ.

TRIBE LIMNOBIINI.

GENUS LIMNOBIA Meigen.

1818. Syst. Beschreib., vol. 1, p. 116.
Limnobia bidentata Skuse.
1889. *Limnobia bidentata* Skuse; Proc. Linnean Soc. New South Wales, vol. 4 (ser. 2), pp. 782, 783.

The following records are included in the material at hand:—Brisbane, April 7, 1914 (H. Hacker). Caloundra, Sept. 30—Oct. 28, 1913 (H. Hacker). Sandgate, Jan. 24, 1914 (H. Hacker).

Skuse describes the radial sector as being only one-third longer than the deflection of $R4+5$; in the present material the deflection is proportionately longer but there are no other apparent differences.

TRIBE ANTOCHINI.

GENUS RHAMPHIDIA Meigen.

1830. Syst. Beschreib., vol. 6, p. 281.
Rhamphidia communis Skuse.
1889. *Rhamphidia communis* Skuse; Proc. Linnean Soc. New South Wales, vol. 4 (ser. 2), pp. 788, 789.

A few specimens in poor condition, from the following locality and dates:—Brisbane, July 30, 1914; September 16, 1918 (H. Hacker).

TRIBE ERIOPTERINI.

GENUS GNOPHOMYIA Osten Sacken.

1859. Proc. Acad. Nat. Sci. Philadelphia, p. 223.
Gnophomyia fascipennis (Thomson).
 1869. *Limnobia fascipennis* Thomson; Eugenies Resa, Dipt., p. 447; ♀.
 1887. *Gnophomyia cordialis* Osten Sacken; Berliner Ent. Zeitschr., vol. 31, pt. 2, p. 199; ♂.

There are numerous specimens of this very interesting fly from the following stations:—Brisbane, October 10-17, 1916 (H. Hacker); several. Sunnybank, near Brisbane, October 27, 1916 (H. Hacker). Caloundra, October 28, 1913 (H. Hacker). Stradbroke Island (H. Hacker).

The differences between the sexes of this fly are remarkable and quite unequalled in any other member of the genus.

GENUS CONOSIA van der Wulp.

1880. Tijdschr. v. Ent., vol. 23, p. 159, Pl. 10, figs. 5-7.
Conosia irrorata (Wiedemann).
 1828. *Limnobia irrorata* Wiedemann; Aussereur. Zweifl. Ins., vol. 1, p. 574.

Several specimens from the following station and dates:—Brisbane, March 23, 1916; April 23, 1916; December 12, 1915 (H. Hacker).

This species is presumably of wider distribution than any other crane-fly, ranging from Australia to South Africa and northward to Japan.

TRIBE LIMNOPHILINI.

GENUS LECHRIA Skuse.

1889. Proc. Linnean Soc. New South Wales, vol. 4 (ser. 2), pp. 830, 831.

LECHRIA SUBLÆVIS sp. n.

Male.—Length, 6 mm.; wing, 6.6 mm.

Female.—Length, about 6.2 mm.; wing, 7.3 mm.

Generally similar to *L. rufithorax* Alexander (North Queensland), differing as follows:—

Rostrum, palpi, and antennæ brown; flagellar segments of the latter suboval to subcylindrical.

Mesonotum reddish brown, the three usual præscutal stripes entirely confluent, the lateral stripes continued back onto the lobes of the scutum. Halteres pale. Wings with the veins light brown, not so distinct as in *rufithorax*; the costal cell is scarcely darker than the remainder of the wing. Venation: *Rs* considerably longer, the section before *r-m* being about equal to the section of *M1+2* before *r-m*; the section of *Rs* beyond *r-m* longer than this crossvein; *Sc* ends opposite or before the end of *Rs*.

Male hypopygium similar to *L. rufithorax*, but the shape of the pleural appendages different; outer pleural appendage slender, gradually tapering to the acute, curved point, with scarcely any denticles on the inner face before the tip as in *rufithorax*; inner pleural appendage more slender and more strongly arcuated.

Habitat: Queensland.

Holotype, ♂, Caloundra, September 30, 1913 (H. Hacker).

Allotopotype, ♀.

Type in the collection of the Queensland Museum.

The genotype of *Lechria*, *L. singularis* Skuse, differs from all the other species of the genus, as known, in that the radial crossvein connects with $R2+3$ at its fork, in the other species connecting with $R2$ some distance beyond the fork. Skuse interpreted the genus as having the vein $R1$ ending in vein $R2+3$ and the crossvein r lacking. The writer would interpret the venation as having the extreme tip of $R1$ atrophied and the radial crossvein present but oblique in position and simulating a section of vein $R1$. These characters are found in many *Cylindrotominae*, and it may be that *Lechria* belongs in the neighbourhood of this subfamily rather than in the tribe Limnophilini where it is now placed.

GENUS GYNOPLISTIA Westwood.

1835. London and Edinburgh Phil. Mag., vol. 6, p. 280.

Gynoplistia viridis Westwood.

1835. *Gynoplistia viridis* Westwood, London and Edinburgh Phil. Mag., vol. 6.

One male from Sunnybank, near Brisbane, October 27, 1914. One female from Brisbane, October 17, 1916 (H. Hacker).

SUBFAMILY TIPULINÆ.

TRIBE DOLICHOPEZINI.

GENUS DOLICHOPEZA Curtis.

1825. British Entomology, vol. 2, p. 62.

DOLICHOPEZA BREVIFURCA QUEENSLANDICA subsp. n.

Mesonotum reddish brown, the præscutum with three darker brown stripes; pleura yellow; legs light brown; wings pale brown, the stigma darker brown; an obliterative area before and beyond the stigma and across the inner end of cell 1st $M2$; abdomen yellow, ringed with brown.

Male.—Length, 9.9-5 mm.; wing, 9.4-10 mm.; antenna, 4 mm.

Female.—Length, 9.4 mm.; wing, 9.3-10.3 mm.

Frontal prolongation of the head short, yellow; palpi pale brown, the

long terminal segment whitish. Antennae of the male moderate in length, light brown. Head brownish grey, especially on the vertex and occiput; front and genae more yellowish.

Mesonotal præscutum reddish brown, with three darker brown stripes; scutal lobes marked with this same colour; remainder of the mesonotum yellow. Pleura yellowish. Halteres pale brownish yellow, the base of the knob darker. Legs with the coxæ and trochanters yellow; remainder of the legs light brown. Wings with a faint brownish tinge; cell *Sc* pale brown except at the distal end; an obliterative area before and beyond the stigma and another across the proximal end of cell *1st M2*; stigma large, subrectangular, brown; an indistinct brown cloud at the basal deflection of *Cu1*; veins pale brown, the tip of *Sc* and *R* below it yellowish. Venation: *Rs* transverse, about equal to $r-m$; cell *M1* rather short; vein *M1* about equal to $M1+2$; petiole of cell *M2* from one-half to two-thirds of $M1+2$; basal deflection of *Cu1* about its own length before the fork of *M*.

Abdomen yellowish, ringed with dark brown; on the second segment at about midlength, on the other segments appearing as a basal ring and a narrow ring on the posterior margin of the preceding tergite. Male hypopygium with the ninth tergite bidentate as in the Australian species of the genus; outer pleural appendages relatively short, about twice the length of the small, flattened, more complicated inner appendage; the proximal face of the outer appendage is indistinctly bidentate. Female ovipositor with the valves acicular.

Habitat: Queensland.

Holotype, ♂, Oxley, near Brisbane, September 4, 1914 (H. Hacker).

Allotopotype, ♀.

Paratopotype, ♂; paratypes, 5 ♀'s, Brisbane, May 23, 1916 (H. Hacker); a few dry fragments, Brisbane, September 18, 1914 (H. Hacker).

Type in the collection of the Queensland Museum.

The present form would seem to be a variety of *Dolichopeza brevifurca* Skuse, although the pleural appendages of the male hypopygium are very much smaller than in any other member of the subgenus *Apcilesis* that I have seen, agreeing more nearly with the normal type of the genus. The variety may be told from the typical form by the darker wings and the structure of the hypopygium.

TRIBE TIPULINI.

GENUS PTILOGYNA Westwood.

1835. Zoolog. Journ., vol. 5, pp. 448, 449.

Ptilogyra ramicornis (Walker).

1835. *Tipula ramicornis* Walker; Ent. Mag., vol. 2, p. 469.

A few specimens of this beautiful crane-fly, from the following station:—Caloundra, September 28—October 28, 1913 (H. Hacker).

GENUS LEPTOTARSUS Guérin.

1838. Voyage de la Coquille, Dipt., p. 286.

Leptotarsus (*Leptotarsus*) *macquarti* Guérin.

1838. *Leptotarsus macquarti* Guérin; Voyage de la Coquille, Dipt., p. 286, pl. 20, fig. 1.

1848. *Tipula tricineta* Walker; List Diptera Brit. Mus., vol. 1, p. 73.

One female, Brisbane, February 12, 1914 (H. Hacker).

SUBGENUS PSEUDOLEPTOTARSUS subgen. n.

Antennæ with nine segments. Terminal segment of the palpus short. Wings with cell *M1* lacking, there being but two branches of media attaining the wing-margin.

Type of the subgenus: *Leptotarsus* (*Pseudoleptotarsus*) *liponeura* sp. n. (Australia).

The presence of but two branches of media is almost unique in the subfamily Tipulinae, the only other case known to the writer being the genus *Idiotipula* Alexander (Natal).

LEPTOTARSUS (PSEUDOLEPTOTARSUS) LIPONEURA sp. n.

Antennæ 9-segmented; last segment of the palpus short; general colouration yellow, the mesonotal præscutum with four brown stripes; mesepisternum and mesosternum plumbeous brown; wings pale brown, sparsely variegated with yellow; cell *M1* lacking; abdominal tergites yellow, the basal four segments ringed caudally with black.

Female.—Length, about 13-13.5 mm.; wing, 13.5-14.6 mm.

Frontal prolongation of the head yellow; nasus broad; palpi brown, the terminal segment darker, shorter than the second and third taken together. Antennæ with but nine apparent segments, the first segment yellow, the remainder of the organ brown; first scapal segment long and slender; second segment subglobular; first flagellar segment oval, the second to fourth produced into a basal pedicel, the terminal three segments nearly cylindrical; the last segment is longer than the penultimate and may be formed by the union of two small segments. Head obscure yellow, very broad behind the eyes.

Pronotum brown. Mesonotal præscutum obscure yellow with four brown stripes, the intermediate pair separated only by a capillary line of the ground-colour, entirely confluent behind; a subtriangular dark-brown area at the humeral angle; remainder of the mesonotum light yellow, each scutal lobe with a conspicuous dark-brown spot at the cephalic lateral angle. Pleura obscure yellow, the mesepisternum and mesosternum plumbeous brown, the latter with a yellow spot immediately cephalo-dorsad of the mesocoxa. Halteres pale, the knobs brown. Legs with the coxæ obscure yellow, the anterior coxæ more infuscated; trochanters dull yellow; femora light brown, gradually darkening to the tips; remainder of the legs dark brown. Wings pale brown, sparsely variegated with yellowish; cells *C* and *Sc* brown; conspicuous brown seams

along the cord and longitudinal veins beyond the cord; the yellow areas are restricted to the basal and anal cells, the first spot basal in position, occupying the inner end of cell *M* and near the base of 1st *A* but interrupted in between; the second area lies across cells *R* and *M* immediately before the origin of *Rs*; a similar pale area across the bases of cells *R3* and *R5*; veins dark brown. Venation: Cell *M1* lacking; *m-cu* punctiform, situated at about midlength of cell 1st *M2*.

Abdominal tergites yellow, the basal two segments brighter, each with a low triangular black band across the caudal margins, the apex of the triangle being directed cephalad; segments 3 and 4 are narrowly margined caudally with brownish black; remainder of the tergites yellowish; sternites yellow, segments 4 to 8 obscure brownish. Ovipositor with the valves very blunt and fleshy as in the genus.

Habitat: Queensland.

Holotype, ♀, Brisbane (H. Hacker).

Paratopotype, ♀, February 12, 1914.

Type in the collection of the Queensland Museum.

GENUS HABROMASTIX Skuse.

1890. Proc. Linnean Soc. New South Wales, vol. 5 (ser. 2), pp. 93, 94.

There have been three Australian and six Ethiopian species of this genus so far made known. In the present collection, two species are included, neither of which agrees with any of the hitherto known forms.

HABROMASTIX PARALLELA sp. n.

Frontal prolongation of the head elongate, light brown; mesonotal præscutum pale brownish yellow with four darker brown stripes; mesonotal postnotum dark brown posteriorly, including a conspicuous mark in front of the halteres; halteres pale at their apices; legs yellowish, the femora and tibiæ tipped with dark brown; wings hyaline, the basal cells cross-banded with grey, in the cell behind vein *Cu* appearing as four dark-brown spots.

Female.—Length, 23 mm.; wing, 19.3 mm. Hind leg, femur, 13 mm.; tibia, 15.8 mm.; tarsus, 35 mm.

Frontal prolongation of the head very long and slender, light brown, with a narrow, slightly darker lateral line; palpi light brown. Antennæ with the basal segments light yellow, the flagellum broken beyond the basal segment, this latter elongate. Head dark brown; eyes large and protuberant, very narrowly separated beneath, more widely separated above.

Mesonotal præscutum pale brownish yellow with four darker brown stripes; remainder of the mesonotum yellow, only the posterior half of the postnotum dark brown, this including a conspicuous area on the lateral sclerites of the postnotum in front of the halteres. Pleura yellow, a conspicuous brown area on the mesosternum, ventral portions of the mesosternum, and on the outer faces

of the fore-coxæ. Halteres long and slender, brown, the apices of the knobs pale. Legs with the coxæ brown, the fore coxæ darker; trochanters brownish; femora pale brown, the tips broadly dark brown; tibiæ yellow, the tips narrowly dark brown; tarsi yellowish. Wings hyaline, variegated with dark brown and light grey; the costal cell is brown with three conspicuous hyaline spaces, one just beyond the *h* crossvein, the last at the end of the cell; cell *Sc* hyaline; the grey areas appear as about four bands that traverse the wings, being continuations of the brown costal areas; in the space immediately behind vein *Cu* these four bands become dark brown and very conspicuous; the hyaline bands between these grey areas are about one-half the width of the latter; indistinct whitish areas in the base of cell *R2*, bases of cells *M1*, 2nd *M2*, and *M4* and in cell 1st *M2*; stigma conspicuous, dark brown; a narrow brown seam along the cord; veins dark brown, paler in the hyaline areas. Venation: *Sc2* ending just before midlength of *R2+3*; *Rs* short, scarcely longer than cell 1st *M2* and shorter than the basal deflection of *Cu1*; *R3* about one-half longer than *R2+3*, running parallel to *R4+5* except at the extreme tip; cell 2nd *R1* narrow; inner ends of cells *R3*, *R5* and 1st *M2* in alignment; petiole of cell *M1* less than one-half this cell; *m* and the deflection of *M3+4* subequal; *m-cu* obliterated by the punctiform contact of *Cu1* and *M3*.

Abdominal tergites yellow, the first brown medially; segments 2 to 5 with an oblique dark-brown dash on either side, these marks converging behind, becoming more approximated on the posterior segments, on segments 6 to 8 appearing as confluent median dashes; a triangular brown mark at the anterior lateral angle of tergites 3 to 8 and at midlength of tergite 2; sternites yellowish. Valves of the ovipositor long and straight, the tergal valves longer.

Habitat: Queensland.

Holotype, ♀, Brisbane (H. Hacker).

Type in the collection of the Queensland Museum.

Habromastix parallela is the largest species so far made known. It is most closely related to *H. remota* (Walker) in the long petiole of cell *M1* and other characters but is readily told by the pattern of the body and wings and the venational details.

HABROMASTIX TERRÆ-REGINÆ sp. n.

Antennæ of the male about one-half longer than the body; legs yellow, the tips of the femora and tibiæ dark brown, remainder of the tarsi dark brown; wings light grey, sparsely variegated with brown and subhyaline; petiole of cell *M1* very short to lacking; abdomen obscure yellow, the tergites with two brown sublateral stripes.

Male.—Length, 11.5-12.5 mm.; wing, 14-15.4 mm.; antenna, 17.5-17.8 mm.

Generally similar to *H. parallela*.

Frontal prolongation of the head yellow, with a narrow brown lateral line; palpi brown. Antennæ of the male considerably longer than the body, the

basal four segments yellowish, thence gradually passing into brown. Head with a rather rather small brown area on vertex, the remainder of the vertex and occiput pale buffy.

Mesonotal præscutum brownish yellow, with four brown stripes, the intermediate pair indistinct in front and strongly narrowed behind; postnotum darkened posteriorly but with no conspicuous mark on the lateral sclerites as in *parallela*. Pleura obscure yellow, the mesepisternum and mesosternum dark coloured, with a conspicuous stripe of the ground-colour across the dorsal portions of the latter. Legs with the femora yellow, the tips broadly dark brown; tibiae light brown, narrowly yellowish basally; tarsi dark brown. Wings light grey, sparsely variegated with brown and subhyaline; cells *C* and *Sc* brown, the former with three small yellowish areas, two being basal in position, the last apical; two small areas in the basal cells, one subbasal, the other subapical; a conspicuous whitish area beyond the cord, extending without noticeable interruption from the inner end of cell *R2* across cells *R3*, *R5*, *1st M2* into the base of *M4*; the brown area in the space behind vein *Cu* is almost continuous, but interrupted by small pale spots at midlength and near the end. Venation: *Sc* ending slightly beyond the origin of *R2+3*; *Rs* short, rather strongly arcuated at origin; *R2+3* rather short, about equal to the basal deflection of *Cu1*; inner end of cell *1st M2* slightly more proximad than cell *R3* or *R5*; petiole of cell *M1* very short to entirely lacking, shorter than *m*; cell *1st M2* comparatively large; *2nd Anal* vein comparatively short and straight.

Abdominal tergites obscure yellow with two sublateral brown stripes, the yellow dorso-median stripe thus formed being most distinct on segments 1 to 6, segments 7 to 9 being almost entirely dark brown; these brown marks on the individual segments oblique, with the posterior ends directed proximad, the posterior lateral angles of the tergites pale; basal sternites light yellow, the fifth to seventh sternites dark brown, especially across the posterior margins.

Habitat: Queensland.

Holotype, ♂, Brisbane, May 23, 1916 (H. Hacker).

Paratopotypes, 6 ♂'s.

Type in the collection of the Queensland Museum.

Habromastix terre-reginæ belongs to the group of *H. cinerascens* Skuse and *H. ornatipes* Skuse. It is the closest to the latter but the description of the details of the wing-pattern of *ornatipes* is very different. It is readily told from *H. parallela* by the short petiole of cell *M1*, the wing-pattern, and other characters.

GENUS MACROMASTIX Osten Sacken.

1886. Berliner Ent. Zeitschr., vol. 30, pt. 2, pp. 185-187.

MACROMASTIX FLAVOPYGIALIS sp. n.

Antennæ short; frontal prolongation of the head very long and slender, dark brown; head dark, the vertical tubercle yellow; mesonotal præscutum

with four dark-brown stripes; scutellum and postnotum obscure yellow; wings pale brown, the costal margin dark brown; abdomen dark brown, the base and hypopygium yellow.

Male.—Length, 12.3-13 mm.; wing, 13-15.5 mm.

Frontal prolongation of the head very long and slender, nearly twice the length of the head, brownish black; palpi dark brown. Antennæ short; scape yellow, flagellum dark brown, the base of the first segment obscure yellow; first flagellar segment not elongated; last segment shortest. Head dark-coloured, the low but conspicuous vertical tubercle yellow; front obscure yellow.

Mesonotal præscutum greyish brown with four darker brown stripes; scutum brown, the scutal lobes dark brown; scutellum and postnotum obscure yellow, the latter narrowly darkened posteriorly. Pleura obscure brownish yellow, the mesepisternum and mesosternum marked with darker. Halteres brownish yellow, the knobs darker. Legs with the fore coxæ dark brown, the remaining coxæ yellow, dark brown basally; trochanters yellow; femora yellow, the apical half passing into brown; tibiæ brownish yellow, tarsi brown. Wings pale brown, the costal and subcostal cells dark brown; stigma pale; veins brown. Venation: *Rs* longer than *R2+3*; petiole of cell *M1* shorter than *m*, sometimes only half its length; *m-cu* punctiform; cell *2nd A* rather narrow.

Abdomen dark brown, the caudal margins of the segments indistinctly paler; segment 1, the base of segment 2, and the hypopygium conspicuously light yellow. Male hypopygium with the pleurites moderately long and slender, with one complicated pleural appendage, the upper lobe of which is produced into a long, slightly curved beak, the crest with several small blackened spicules; lower lobe pale, flattened, oval, the apex rounded.

Habitat: Queensland.

Holotype, ♂, Brisbane, May 23, 1916 (H. Hacker).

Paratopotype, ♂.

Type in the collection of the Queensland Museum.

Macromastix flavopygialis may readily be told from all the described Australian species by the very long, slender, dark-coloured frontal prolongation of the head and the conspicuous colouration of the abdomen.

MACROMASTIX TORTILIS sp. n.

Antennæ short; general colouration light yellow, the præscutal stripes slightly more reddish; wings greyish yellow, the costal and subcostal cells rich brownish yellow; abdomen yellow, trilineate with brown, segments 7 and 8 chestnut brown; ninth tergite of the twisted male hypopygium large and tumid.

Male.—Length, about 10-12 mm.; wing, 12-14.7 mm.

Female.—Length, about 10-11 mm.; wing, 11.55-12.5 mm.

Frontal prolongation of head short and stout, yellowish; palpi brown, the last segment about equal to the basal three taken together. Antennæ shorter than the palpi, the scape yellow, the flagellum dark brown; flagellar segments beyond the third slender, cylindrical. Head light yellow; vertical tubercle low.

Mesonotal præscutum light yellow, with the three usual stripes more reddish yellow; remainder of the mesonotum pale yellow; an indistinct, capillary, median brown line. Pleura yellow. Halteres pale brown, the knobs darker. Legs with the coxæ and trochanters light yellow; femora yellow, the tips narrowly and indistinctly infuscated; tibiae and tarsi brown. Wings greyish yellow, the costal and subcostal cells rich brownish yellow; stigma yellowish brown; veins brown. Venation: *Rs* scarcely longer than $R2+3$; *R5* long, parallel to $R1+5$ except at the tip; petiole of cell *M1* variable in length, from as long as *m* to entirely lacking, cell *M1* being short-petiolate to sessile; *m-cu* punctiform.

Abdomen yellow, the tergites with three brown stripes, the median stripe very broad and conspicuous; segments 7 and 8 chestnut brown; hypopygium yellow, only the ninth tergite brown; sternites yellow. Male hypopygium with the ninth segment twisted around nearly one-half so that the ninth tergite occupies a ventro-lateral position; this latter is large and tumid, with a broad U-shaped median notch, the margins very thick, the conspicuous lateral lobes thus formed stout-triangular. The pleural appendages are two in number, the dorsal one (nearest the tergite though actually ventral in position) a small blackened blade with the inner edge conspicuously serrate; the ventral appendage is larger, pale, flattened, gradually dilated distally, the apical margin set with about fourteen blackened spicules of which the four inner are isolated from one another, the remaining one confluent in a slightly curved row. Ovipositor with the valves short and fleshy as in the genus.

Habitat: Queensland.

Holotype, ♂, Brisbane, July 1, 1913 (H. Hacker).

Allotopotype, ♀.

Paratopotypes, 18 ♂ ♀ 's, July 1 (1913) and May 23 (1916)

Type in the collection of the Queensland Museum.

Macromastix tortilis is readily told from the other described species of the genus by its light-yellow colour, the trilineate abdomen, and especially the large, twisted male hypopygium.

MACROMASTIX HACKERI sp. n.

Antennæ short; general colouration yellow; wings brownish yellow, the costal margin more saturated; stigma darker brown; cell *2nd A* very narrow; male hypopygium semi-inverted, the ninth tergite pale; ninth sterno-pleurite with a pencil of about seven powerful bristles near the dorso-caudal angle.

Male.—Length, about 11 mm.; wing, 12.5 mm.

Generally similar to *M. tortilis*.

Frontal prolongation of the head short and stout, obscure yellow; palpi brown. Antennæ short, pale brownish yellow, the distal flagellar segments long-cylindrical. Head yellow.

Mesonotum and pleura dull yellowish, the præscutum without distinct stripes. Halteres pale brown. Legs with the coxæ and trochanters dull yellow, the remainder of the legs pale brown, the tips of the femora narrowly darkened. Wings with a strong brownish yellow tinge, the costal and subcostal cells more saturated; stigma conspicuous, darker brown. Venation: Basal deflection of *Cu1* at about one-third the length of cell *1st M2*; cell *2nd A* very narrow.

Abdomen obscure yellow, the lateral margins of the tergites narrowly and indistinctly dark brown; the dorso-median stripe of *tortilis* is lacking; segments 7 and 8 brown; hypopygium entirely pale yellow, including the ninth tergite. Male hypopygium of the semi-inverted type of *M. tortilis*. Ninth tergite not so tumid as in *tortilis*, with a broad and deep U-shaped notch, the dorsal surface provided with numerous stout setæ, the free ends of the tergite produced caudad and slightly inward into a subspatulate, flattened lobe. Ninth sterno-pleurite with a large, square median notch; near the dorso-caudal angle with a pencil of about seven powerful bristles that are directed dorsad and caudad.

Habitat: Queensland.

Holotype, ♂, Brisbane (H. Hacker).

Type in the collection of the Queensland Museum.

This interesting species is named in honour of the collector, Mr. Henry Hacker, Entomologist of the Queensland Museum. It is closest to *M. tortilis* but is readily separated by the diagnostic characters listed above.

LITTLE PENGUIN IN QUEENSLAND.

BY HEBER A. LONGMAN, F.L.S. (DIRECTOR).

THROUGH the kindness of Mrs. Fagan, "Greenmount," Tweed Heads, a specimen of the Little Penguin, *Eudyptula minor nova-hollandiae* (Stephens), captured at Coolangatta beach near the southern border of this State, has been added to the Queensland Museum collections. Mrs. Fagan records that this specimen was picked up alive on the 15th May of this year; it refused to eat anything and died within about twenty-four hours after capture.

The occurrence of this specimen within the Queensland border is a matter for surprise. According to A. J. North,¹ Cabbage-tree Island, near the entrance to Port Stephens (about S. lat. 32° 40') was the most northerly record (breeding). Coolangatta is north of Point Danger, about S. lat. 28° 7'. The Little Penguin just succeeded in crossing our boundaries.

Apparently this bird requires trinomial designation. Mathews refers to the variations shown in specimens from West Australia, Tasmania, South Australia, and New South Wales, but finds "that the white tail of the Australian form renders it separable from the New Zealand bird, which is also constantly darker."² He utilises Stephens's term *nova-hollandiae* for Australian birds as a subspecies of *E. minor*, subsequently restricting this to New South Wales forms and noting other subspecies. Alexander and Brooke Nicholls, however, after a valuable study of a large number of specimens, came to the conclusion that all the Australian birds (including *E. undina*) should be classified as *Eudyptula minor nova-hollandiae*.³

In view of the scantiness of available material for comparison no extended description is made. Our specimen has the characteristic blue-grey colouring, with a beautiful sheen, on the upper surface; the inner margins of the flippers are whitish, as is also the apical third of the tail; the fore-neck and lower surface are white. Following the body curves of the mounted specimen the bird is 460 mm. in length. The bill is 38 mm. in length; depth 15 mm.

From the excellent skin made and forwarded by Mrs. Fagan, our taxidermist (Mr. M. J. Colclough) has mounted the bird, which makes a very attractive addition to the case of penguins on exhibition.

¹ Nests and Birds Austr. & Tas., iv, 1914, p. 392.

² Birds of Australia, i, pt. 5, 1911, p. 285.

³ "The Emu," xviii, 1918, pp. 50-57.

(ISSUED FEBRUARY 11, 1921.)

A NEW GENUS OF FOSSIL MARSUPIALS.

BY HEBER A. LONGMAN, F.L.S.,
Director of the Queensland Museum.

(Plates IV-VII.)

IN 1915, when describing a giant turtle from the Queensland Cretaceous formations, the writer ventured to forecast that, when our areas were better known, novelties rivalling the grotesque monsters of other lands would be exhumed. No new vertebrate material has yet been received from these Cretaceous sources, but remains from the Post-Tertiary deposits on the Darling Downs, which form the subject of this paper, exhibit a large marsupial with remarkable cranial contours. In life this mammal must have been bizarre as a monster in an artist's realm of phantasy. Here is a member of the *Nototherium* group with a skull the maximum width of which exceeds the maximum length by 46 mm.

This extreme brachycephalous condition is mainly the result of masseteric processes or large inferior lateral extensions of the anterior part of the jugal, which flare widely outwards on each side of the head, almost at right angles to the sagittal plane, at the junction of the infratemporal bar with the zygomatic processes of the maxilla. For reasons to be subsequently set out, it is suggested that this unusual development of the zygomatic arches was associated with the presence of large cheek-pouches.

DIAGNOSIS OF NEW GENUS.—The extraordinary development of the inferior lateral processes of the anterior part of the zygomata and the architecture of the very prominent suborbital platform, which acts as a buttress, demand generic recognition. These characters are also associated with a subtriangular upper premolar (dealt with in detail later).

EURYZYGOMA, genus new.

De Vis associated with the mandibles of his *Nototherium dunense* (1887, p. 1065, and 1888, pp. 111-116),* two cranial fragments (Nos. 12622 and 12618) which are obviously of the type of our new material, and which also came

* In this paper references are noted in the manner suggested in a circular recently issued by the Committee of the British Association on Zoological Bibliography.

from the Darling Downs, being heautotypes. These specimens, however, were too incomplete to suggest to De Vis the immense accessory processes. Sufficient of the anterior zygoma root is present to show the special characters of *Euryzygoma*. It would therefore be unwise to give our material a new specific name. In the circumstances, it is necessary to use De Vis's specific name in conjunction with the new genus.

EURYZYGOMA DUNENSE.

MATERIAL.—This consists of a cranium which was received in over seventy pieces. The maxilla and premaxilla were practically the only parts which were intact. Fortunately the bones were in excellent condition, not being decomposed, and as many of the fractures were obviously made in bringing the remains to light, the zygomatic arches, with their inferior lateral processes, and the main portion of the superior cranial contours have been united without any doubt as to their real position. The fitting together of the smaller pieces, especially in the basioccipito-sphenoidal region, however, demanded infinite patience. Practically no reconstruction was necessary, the actual bones themselves supplying the natural contours, and it has been deemed inadvisable to fill in the comparatively unimportant missing parts. The full molar series is present on each side, but the incisors have been lost *post mortem*.

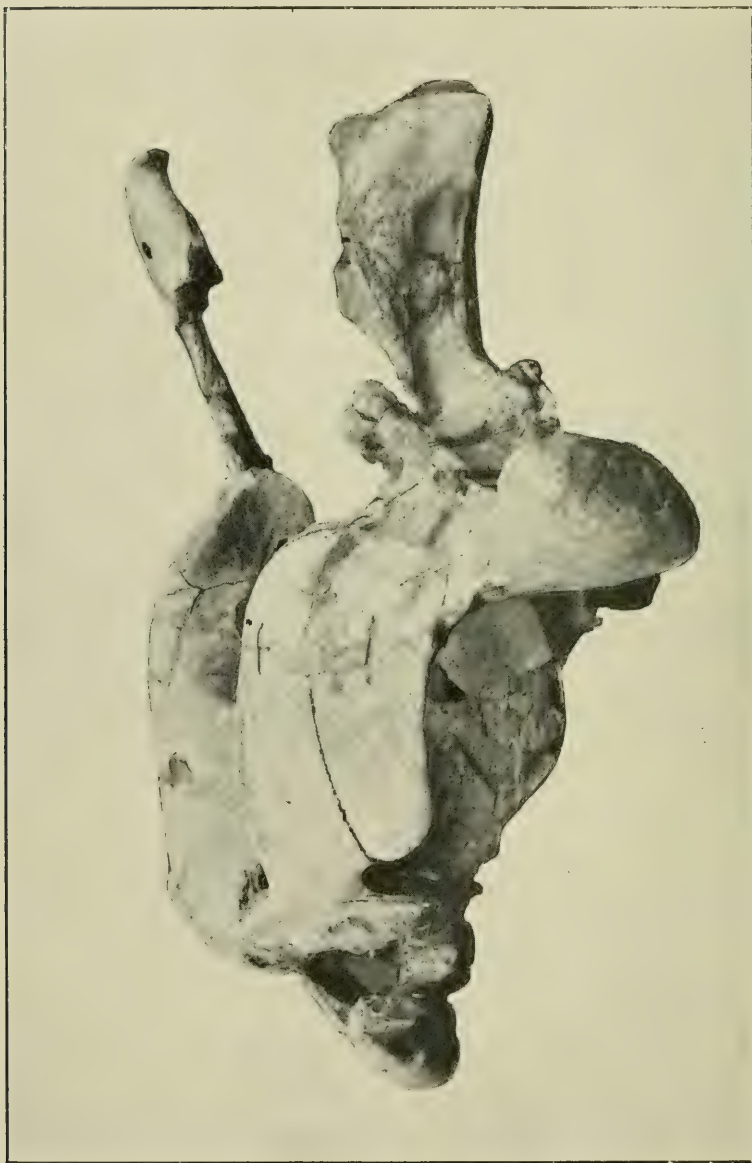
The specimen was probably a fully mature male. Many of the cranial sutures are ankylosed to extinction. Reg. No. F 1327.

LOCALITY.—The cranium was discovered in sandy soil at a depth of about 70 feet at Brigalow, Darling Downs, Queensland, when a well was being sunk on the property of Mr. G. A. F. Kleidon, who subsequently donated the fragments to the Queensland Museum. On behalf of this institution it is my pleasant duty heartily to thank Mr. Kleidon, and also Mr. Wilson who forwarded the pieces. It is to be hoped that this handsome donation will be supplemented later by remains from this district demonstrating an association of bones.

DESCRIPTION.—The maximum length of the cranium "between uprights" (condyles to gnathion) is 634 mm.; the maximum breadth across the zygomatic processes is 680 mm.; the maximum height (between parallels from the bregma and the inferior border of the zygomatic processes) is 343. The calvarium is dwarfed by the extraordinary development of the zygomatic arches and processes. The breadth of the occiput (calculated from the fairly complete left moiety) is approximately 290 mm. The occipital region, which is somewhat concave, with a median vertical ridge, slopes forward at an angle of 45° to the plane of the bony palate. Posteriorly the lambdoid crest is broadly convex. From the lambdoid crest, the superior contour of the calvarium along the

MEMOIRS OF THE QUEENSLAND MUSEUM.

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EURYZYGOMA DUNENSE; lateral view.
Approximately one-fifth natural size.

Photo.—H. W. Mössly.

sagittal suture to the fronto-nasal depression is practically a straight line, which is parallel with the plane of the bony palate. There is no parietal platform, and the cranial walls, when losing their curves of contact with the occiput, slope in straight lines to their fractures. In the mid-parietal region these walls form an angle of 50° . The lower moieties of the lateral walls are missing.

On the dorsal surface the sutures between the parietals and frontals are obscured. In this area the sagittal crest bifurcates, as in *Phascolarctus*; the frontals rapidly widen and when in line with the inferior zygomatic processes they attain a breadth of 148 mm. This breadth is apparently continued (contours incomplete) through the course of the fronto-nasal depression. The concavity of this depression is wide, the sides and posterior wall sloping sharply to the main frontal platform. The course of the fronto-nasal sutures cannot be traced with accuracy. The terminal areas of the frontal bones are slightly rugose on the slope of the depression, and there are a few very small nutrient foramina. A small horn or frontal boss may have been attached here (cf. Scott & Lord, 1920).

Nasals.—From the frontal depression the nasals reach almost to a point above the gnathion. Except for a slight convexity, which is double in the anterior region where the median suture is open, they are surprisingly flat on their upper surface, which projects forward at an angle of about 18° to the plane of the bony palate. Their course does not appear to be curved, or to terminate in a deflected obtuse apex. The left-hand moiety is perfect anteriorly, and is 88 mm. in width. A right-hand fragment is sufficient to give fair evidence of symmetry, and the approximate width would thus be 176 mm. There is no evidence whatever of the presence of bony studs, of which Scott and Lord have made interesting studies in Tasmanian material (*N. mitchelli*), or of attachments for a horn, as first suggested by Macleay in his original description of "*Zygomaturus trilobus*" in 1857 (quoted by Owen, 1859, p. 169).

The lateral portions of the naso-maxillo-premaxillary region are, unfortunately, too incomplete to be correctly allocated, and it has been thought inadvisable to restore the missing parts. It is evident that the anterior portions of the nasals projected clear of lateral supports for a distance of at least 75 mm. Fragments of the sides, and especially one piece exhibiting the maxillary-nasal suture, show the great strength of the bones supporting the main nasal arch. On the inner median surface of the nasals, near the suture with the frontals, may be seen two large sub-contiguous channels, 11 mm. wide and 5 mm. deep, and these extend towards the anterior extremity where they are merged in the general concavity of the inner tables.

Zygomatic Arches.—These are fairly symmetrical. Part of the ventral border of the left arch is missing, and the right inferior lateral process is incomplete in its inner contours, but fortunately the opposite bones are in excellent condition. The dorsal or superior border of the squamosal element of the arch is at first shortly concave when leaving the occipital region, being then slightly and evenly convex until the downward sweep of the orbit is reached. The inferior or jugal border is much more robust, attaining a thickness of 56 mm. where the jugal approaches the glenoid cavity. In this respect the cranium resembles the relationship of these parts in *Phascolarctus*, the posterior extension of the jugal being a primitive condition.

The squamosal element appears to be produced anteriorly to a greater extent than is to be found in either *Phascolarctus*, *Phascolomys*, or *Macropus*, and sends a V-shaped strip of bone as far down as the mid-region of the orbit. The line of demarcation between the squamosal and jugal bones can be readily traced throughout the arch. The height of the arch opposite from the fronto-parietal suture is 130 mm., the squamosal element here having the greater share. The walls are not vertical, but sweep outward as they gain depth; in fact, a section taken through the arches in the mid-parietal region would show, with the contours of the occiput behind, a slightly flattened semicircle, the radius of which would be about 8 inches. The maximum width of the zygomata, apart from the outstanding processes, is 415 mm.

W. K. Parker (1886) pointed out that an inordinately large squamosal is characteristic of the Marsupialia. In the arch of *Euryzygoma* this bone reaches its maximum development. It is to be regretted that the squamous plate is missing and that its extent on the walls of the cerebral chamber cannot be traced. In the Marsupialia this plate reaches its maximum in *Wynyardia bassiana*. (Baldwin Spencer, 1900, p. 779).

Owing to the incompleteness of the cranial walls the width of the temporal fossa cannot be accurately estimated, but in the mid-parietal region it was evidently about 65 mm., widening somewhat anteriorly. The facial portion is elongated, as may be seen from Plate V, and the width averages 77 mm. The orbits are low, but not to the same extent as in *N. mitchelli*, being 90 mm. above the alveolar margins of the molars. Although the outer margins of the orbits are more posteriorly placed than is the case in *N. mitchelli*, there would have been little scope for lateral vision, and *Euryzygoma* evidently went through its world viewing only the region immediately in front.

A slight prominence on each side of the orbit, situated at the origin of the suture between the jugal and the squamosal, indicates rudimentary postorbital processes. Part of the inner margin of the orbits and the lachrymals are missing.

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EURYZYGOMA DUNENSE; frontal view.

Photo.—H. W. Mobley.

INFERIOR LATERAL PROCESSES.—Across the processes the extreme breadth is 680 mm. On the left-hand side the maximum transverse diameter of the inferior lateral process is 231 mm. The vertical height of the process in its lateral extension beyond the arch is 121 mm. The maximum thickness is 47 mm. The extreme height of the combined elements, from the superior border of the squamosal to the inferior border of the vast processes (taken from parallels) is no less than 285 mm. When the cranium is resting on the inferior borders of the processes the molar series are 64 mm. above the surface. This downward development is surpassed by the inferior processes of *Mylodon*, but in that mammal there are no lateral extensions.

The processes flare outward almost at right angles to the sagittal plane, as may be seen from Plate V. They are not, however, straight, but slightly curved, the lateral margins being in advance. There are prominent rugose areas on the superior border of these processes, just at the origin of their lateral extensions, these being doubtless for the attachment of parts of the masseteric muscles.

The origin of the zygomatic process of the maxilla is primarily a vertical plate which abuts on practically the whole of the vertical face of the maxilla, commencing parallel with the anterior lobe of the third molar, and being about 30 mm. in thickness; this is supported above by the horizontal orbital plate 14 mm. thick, *which is produced anteriorly at right angles to the vertical constituent*, forming a triangular platform which is continuous behind with the superior border of the maxilla: this horizontal orbital platform unites the vertical plate with the strong convex bar which forms the lower border of the orbit, and through the inner root of which the large infra-orbital foramen passes. The lateral extension of this bar forms a strong supporting buttress for the accessory processes. With the exception of the suborbital bar, the whole pier is composed of maxillary elements, but the sutures at the orbit cannot positively be traced, owing to fractures. The whole architecture of this part of the skull is quite unlike the piers of the zygomata in Macleay's cast, and is also absolutely distinct from other cranial fragments in the Queensland Museum attributed to *N. victoriae*. The deep rectangular suborbital recess is a marked feature.

Of the extreme width of the accessory process, the maxilla forms less than one third. The zygomatico-maxillary sutures on the anterior surface are produced laterally to a far greater extent than are those on the posterior surface, giving the maxillary element, as illustrated in Plate V. a greater proportion than really exists. It may here be noted, as W. K. Gregory (1910, p. 221) has pointed out, that many of the cranial bones of marsupials are very oblique in their areas of contact.

Maxilla and Molars.—The bony palate is well preserved and there are no signs of fenestrations. The floor is slightly concave transversely, with a median

ridge. At the border of the mesopterygoid fossa there is a prominent transverse ridge, through which a foramen runs on each external corner. The average depth of the palate below the alveolar margins is 7 mm.

The molar series are in symmetrical arcs, the lobes of the teeth being obliquely set. Fortunately all the teeth are *in situ*.

Premolar: The premolar is subtriangular: length 20 mm., breadth 18 mm. There is a single oblique transverse lobe, on which a wide tract of dentine with a posterior loop is exposed. This has evidently been worn from a single central cusp with a median posterior depression. There is a narrow posterior talon, the lingual border of which is continuous on the inner side with an anterior talon on the contracted front angle of the tooth. This premolar agrees well with that described by De Vis (1888, p. 115) as typical of his *N. dunense* and also illustrated in his accompanying Plate. Both teeth are well preserved in our specimen, and no special differences are to be noted between them. The relations of the premolar with those of other Nototheres are commented on elsewhere.

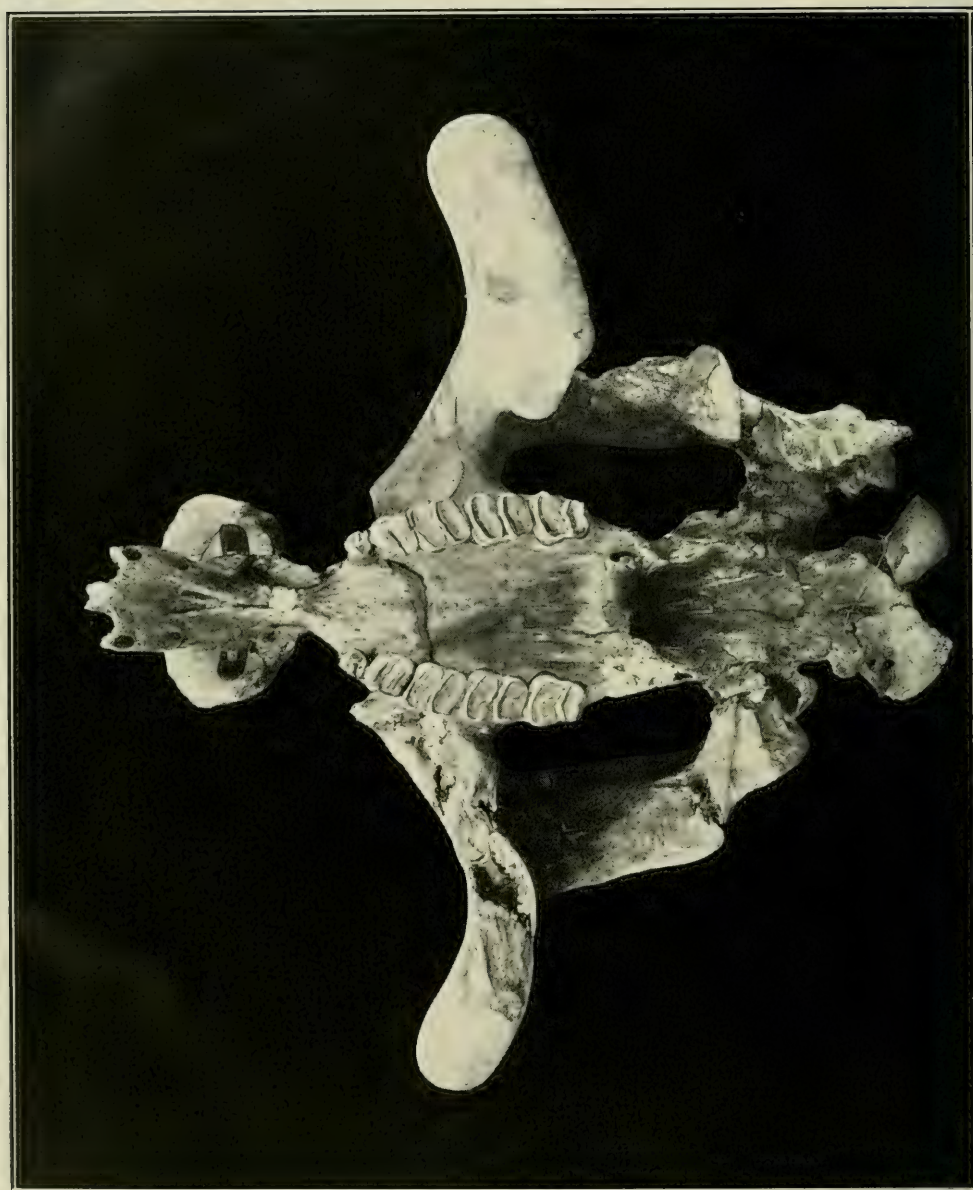
Molars: The bilophodont molar series is well worn, a tract of dentine 8 mm. wide being exposed on the hind lobe of m^4 . From m^1 to the front lobe of m^3 the series gradually increases in size. The posterior lobe of m^3 is less wide than the anterior. M^4 is anteriorly slightly less wide than the corresponding lobe of m^3 , and the hind lobe is markedly narrowed. Anterior and posterior talons are well developed throughout, except in the first true molar, where demarcations are lost in the surfaces of wear. The anterior talons on the second, third, and fourth molars are more developed on the lingual surface, whereas the posterior talons are more prominent labially, this being in consonance with the oblique setting of the lobes. On the lingual side the valleys between the lobes are bounded and partly closed by a tubercle arising from cingular processes, but these are not so marked on the outer side.

Dimensions.							mm.
Antero-posterior diameter of molar series with pm^4 , right							172
Antero-posterior diameter of molar series with pm^4 , left							169
Width of m^1 , anterior lobe							28
Width of m^2 , anterior lobe							35
Width of m^3 , anterior lobe							36.5
Width of m^4 , anterior lobe							35
Palate breadth between outer corners of pm^4							102
Palate breadth between outer corners of m^3 , front lobe							158
Palate breadth between outer corners of m^4 , hind lobe							152
Palate breadth between inner corners of pm^4 , front lobe							64
Palate breadth between inner corners of m^3 , front lobe							85
Palate breadth between inner corners of m^4 , front lobe							90
Diastema							112
Palatal length,* palation to gnathion							390

*Oldfield Thomas, Nomenclature of Measurements, Proc. Biol. Soc. Wash., xviii, p. 192, 1905.

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EURYZYGOMA DUNENSE; ventral view.

Photo.—H. W. Mobbs.

The maxilla extends anteriorly on the floor of the palate for a distance of 110 mm. beyond the premolars. The palate is here convex with a median groove. The lateral sutures between the maxilla and the premaxilla cannot be satisfactorily traced.

Premaxilla.—*Euryzygoma dunense* is relatively longer in the facial region than is the cast of the cranium described by Macleay. The gnathion is 187 mm. from the anterior borders of the premolars. The diastema is 112 mm. In section the premaxilla is subquadrate. Owing to fractures its union with the nasals is missing on both sides. On its palatal surface it is concave in the region between the two posterior incisors, where there are three small foramina. The premaxilla is thickened anteriorly and its superior margin terminates in a raised oval boss, which suggests an attachment for cartilage. At the alveoli of the large first incisors the width is 74 mm., and the height is 101 mm. The incisors have been lost, *post mortem*, but the dimensions and disposition of their cavities give valuable evidence of their nature. The large anterior pair were evidently strongly curved in their downward course, and were subcylindrical and only slightly diverging. At the antero-inferior border the alveoli are separated by a distance of 19 mm. A loose incisor, 23×29 in diameters, from another specimen, fits fairly well into either cavity. On the anterior surface of the premaxilla there are extensive exposed alveolar surfaces. The alveolus of the second incisor, which is contiguous with that of the first on the labial border, is approximately 13×11 . The third incisor alveolus is placed on the labial border about 15 mm. behind that of the second, to which it is subequal. It is evident from its contours that the third incisors were obliquely set and procumbent in position.

For purposes of description the premaxilla has been treated as a single and not as a paired bone.

Glenoid Fossa.—Although the postglenoid process is very incomplete, the actual fossa is well preserved on the right-hand side. This is 102 mm. in length, whilst the actual concavity, apart from its shelving anterior border, is 15 mm. Some idea of the articular surface of the mandibular condyle may be gauged from these dimensions. The plane of the fossa is set at an angle of 85° to the median line of the cranium, the condyle thus being scarcely oblique in its setting. Laterally the posterior extension of the jugal forms part of the shelving anterior border of the fossa.

Basal Bones.—The basioccipital and basisphenoid have been greatly fractured, about fifteen segments forming the contours which have been put together. The combined bones slope upwards at an angle of 18° from the plane of the bony palate, being 12° less than the angle noted by Owen for the cast of

Nototherium. From the palation to the basion the distance is 220 mm. The aperture of the posterior nares at the palation is 53 mm. deep and about the same in width. The posterior borders of the mesopterygoid fossa are incomplete, but there was a depth of at least 65 mm. The walls of the fossa expand somewhat in their course from the maxillary region. In section the fossa is U-shaped. The external walls are marked with very prominent tubercles for muscle attachments. On each side a large entocarotid foramen is to be seen, which perforates the floor of the basisphenoid and enters the inner tables between the Gasserian grooves, its course having been cleared on the left-hand side.

The sutures between the basioccipital and basisphenoid on the inferior surface can be traced at a distance of 83 mm. from the basion. The inferior surface of the former bone is deeply concave, with a strong longitudinal ridge. In its advance from the foramen magnum the bone somewhat narrows in breadth.

The contours of the foramen magnum are not quite complete. The transverse section is oval, with diameters (approximately) of 65×35 . Both condyles are present, but only the right can be conjoined with its natural surface. Its diameters are: Maximum length 78 mm.; extreme breadth 42 mm. Unfortunately the lateral elements of the occiput are largely missing.

The prominent condylar foramina are paired, being subequal, and externally the openings are separated by a distance of 7 mm. It has been suggested that the accessory foramen is homologous with those of the *Crocodynta*.

Interiorly the basioccipital and basisphenoid form a level platform about 65 mm. in width, but the supero-lateral elements are missing. On the external border of the former may be seen, at the fractures, part of a large groove which probably corresponds with the inner border of the jugular foramen.

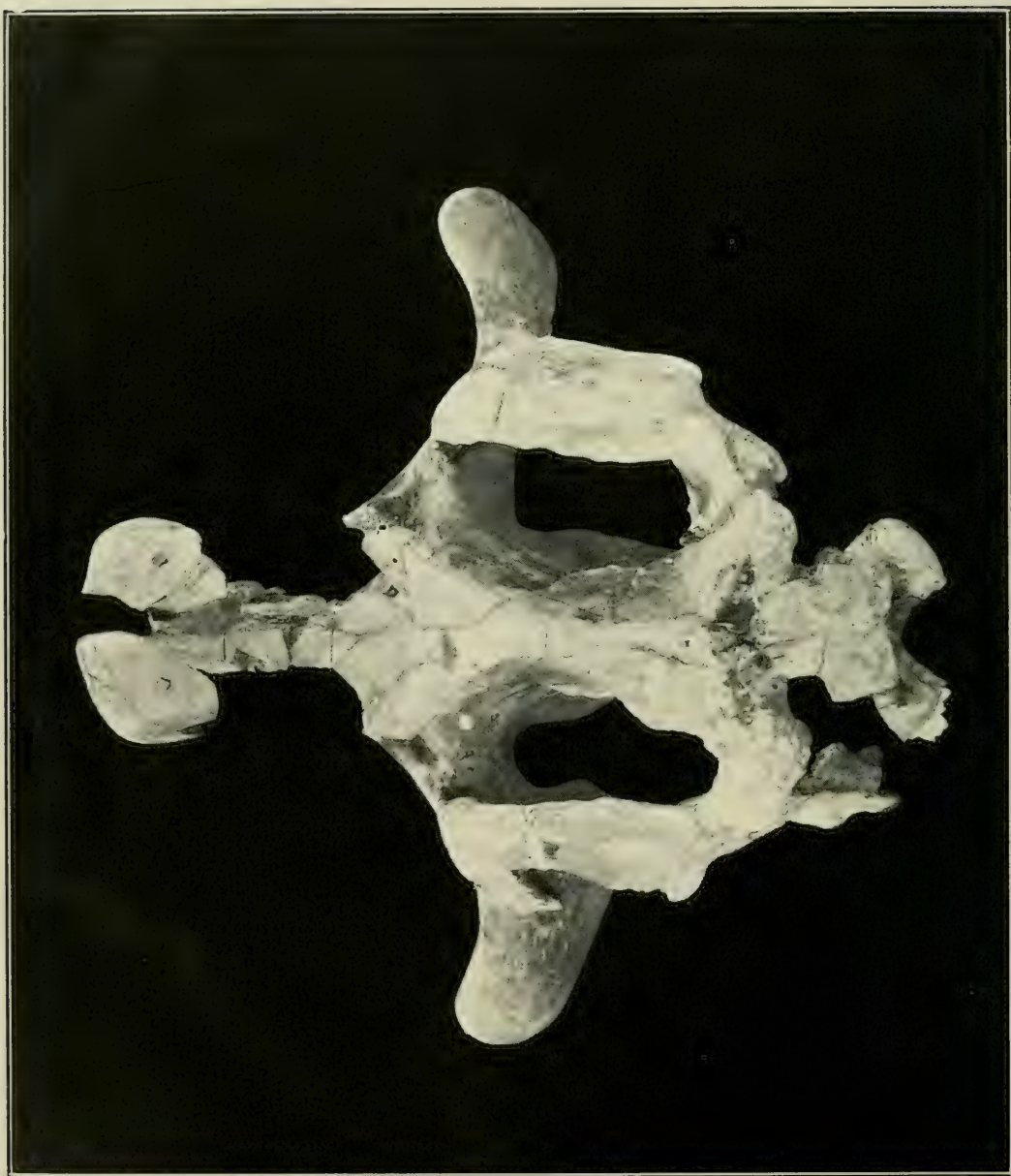
There are prominent grooves, slightly diverging anteriorly, for the accommodation of the Gasserian ganglion; from the grooves posteriorly the position of the foramen rotundum is barely indicated on each side. Anteriorly the basal bones are incomplete, and the whole ethmoid region is missing.

In the mature cranium of *Phascolomys* the cranial walls are greatly thickened in the supra-occipital region, and large sinuses are present which are not to be found or are but slightly developed in *Macropus* and *Phascolarctus*. Our fossil resembles the wombats (*Phascolomys*) in this respect. The walls of the cranium are surprisingly thick in this area and large sinuses are present.

The internal tables of the cranium, in so far as they are available for description, exhibit irregularities in the region of the sagittal suture. There is an irregular median ridge, which is much distorted in the mid-parietal region, probably associated with a sinus. The crania of many marsupials are much thickened in the sagittal region. Anteriorly there is evidence of large frontal sinuses.

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EURYZYGOMA DUNENSE; dorsal view

Photo.—H. W. Mobbs.

The cerebral chamber was evidently small and elongated. The brain was of the elongated type, having such reptilian affinities as may be assumed from a comparison of the cranium of the marsupial *Thylacinus* with that of the dingo. Judging from such measurements as can be taken, the brain of *Euryzygoma* appears to have been relatively smaller than those of the native bear, kangaroos, and wombats. The parietal walls meet in transverse section at an angle of 50° , and the superior areas of the brain were thus much constricted laterally.

Cheek-Pouches.—Owen (1877, p. 259) refers to the maximum development of the zygomatic arches in the *Nototheres*, and records the necessity for increased attachment areas for the premasseter muscles. In *Euryzygoma* the masticatory muscles were doubtless strongly developed, but it seems to the writer that the bony architecture of the inferior lateral processes is too massive to be entirely accounted for in this way. Much of the area is also so smooth that the extensive origin of masticatory muscles is not suggested. The development of large cheek-pouches may therefore be assumed in association with these huge processes. There can be no direct evidence bearing on this point, but it is interesting to note that the Pocket Gophers, or Geomyidæ, of North America as illustrated by C. H. Merriam (1895) show a great development of the zygomata, although there are no inferior lateral processes. The cheek-pouches of these rodents are characteristic.

It would undoubtedly have been of advantage for this gigantic herbivorous marsupial to be able to obtain large masses of food, probably from swamp vegetation, some of which could be temporarily stored in cheek-pouches, and digested at leisure. It may even be suggested that the presence of the large crocodile, *Pallimnarchus pollens* De Vis (whose remains are found in the same deposits) made a hurried meal sometimes a necessity for *Euryzygoma*.

In his study of the Geomyidæ, C. H. Merriam (1895) has pointed out that with advancing age there is a lateral development of the zygomatic arches. Probably the inferior lateral processes of *Euryzygoma* are relatively more prominent in adult than in juvenile forms. A study of present-day marsupial crania, however, shows that no great change takes place with age.

It is of great interest to note that in the Native Bear (*Phascolarctus*) and the Wombats (*Phascolomys*) small cheek-pouches have been recorded (Forbes, 1881, p. 182).

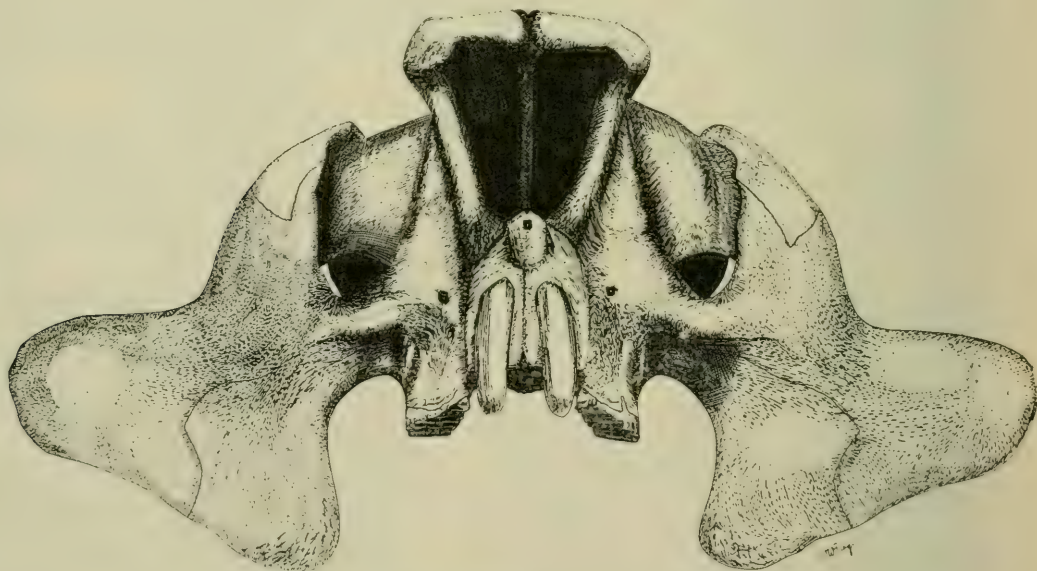
Had the cranium of *Nototherium mitchelli* not been already known, the special processes of *Euryzygoma* would have appeared to be still more remarkable. The evolution of the latter from true *Nototheriums* can be realised, however, and another instance is afforded of the astounding variety to be found amongst the Marsupialia.

Euryzygoma may be defined as a specialised member of the Nototherian group, and, to use Gregory's terms, its large processes were a cœnotelic character related to special food-habits.

Mandibles.—Unfortunately there is no mandible directly associated with the cranium under review. De Vis (1887, p. 1065) described three examples, one (No. 5489) being illustrated as the type. His diagnostic characters are here reproduced:—

“Tusk-like incisors well developed; premolar small, sub-triangular, unilobate; inlet of dental canal much behind postmolar angle and much above alveolar level; exterobasal ridges of molars interrupted; talons anterior and posterior well developed; molars gradually enlarged; inner symphyseal curve opposite hinder lob of m^1 .”

A full description of the three examples follows in the original paper. In the following year, De Vis (1888) illustrated the upper subtriangular premolar of “*Nototherium dunense*,” previously referred to in this paper as a heautotype.



Text-fig. 1.—EURYZYGOMA DUNENSE. Reconstruction of cranium; one-fifth natural size.
Drawn by O. W. Tiegs.

TAXONOMIC.—In classifying the Marsupialia of to-day the premolar is recognised as the most important tooth, and that tooth alone is sufficient to establish the identity of many species. The evidence of divergent premolars is thus not to be lightly put on one side. Lydekker (1889) thought that the large

complex premolar on the right side of Macleay's "*Zygomaturus trilobus*" was an abnormality or was incorrectly associated with the cranium. Scott (1915, p. 10) also quotes a remark from him which shows that Lydekker did not consider this oval tooth as characteristic of *Nototherium*. But Scott's illustrations and descriptions show that this large tooth is associated with the specimen described by him as *Nototherium tasmanicum* and with *N. mitchelli*. Glauert (1912) also figured (Plate VI, fig. 10) a West Australian tooth of a somewhat similar character. Amongst our specimens are three loose teeth of this type and an additional one is *in situ* in a maxilla with the rest of the molar series. It should also be noted that one of the teeth figured as the type of *Prochærus celer* by De Vis is of interest here, as pointed out by the writer when dealing with this material (Longman, 1916, p. 86).

In response to my request, Mr. Charles Hedley, Australian Museum, has kindly forwarded a note on the premolars of Macleay's "*Zygomaturus trilobus*," as observed by Messrs. Thorpe & Troughton, of the Museum staff. This states that both teeth are firmly *in situ*, the right one being nearly complete, but that "on the left side is badly fractured."

This clearly shows that the large oval premolar is not an abnormality, but a definite characteristic of Macleay's "*Zygomaturus trilobus*." It certainly follows that *all crania with triangular premolars are generically distinct*.

Although *Nototherium inerme*, first described by Owen (1845, p. 231) as indicating a distinct genus "by a total absence of incisors," has page precedence (a single page!) over *N. mitchelli*, the rules of international zoological nomenclature give latitude for the selection of the second species as the type. *Nototherium mitchelli* is certainly the "best described, or best figured, or best known" of the three species recorded by Owen from mandibular types. Notwithstanding the discrepancies between the views of Owen, Lydekker, and De Vis as to the premolars of *Nototherium*, Lydekker's action in taking *N. mitchelli* as the typical species should be confirmed, and that species is hereby selected as the type of *Nototherium*, *sensu stricto*. The cranium described by Macleay thus becomes a heautotype, and *Simoprosobus* De Vis (1907) is a synonym. A second species is *N. tasmanicum*, the subject of Scott's excellent monograph (1915).

Apart from *Euowenia*, there are two other kinds of Nototherian crania with subtriangular premolars. In one, typified by *N. victoriae*, the zygomatic arches are relatively normal, and judging from fragments in the Queensland Museum these crania may require a distinct generic name when better known.

Euryzygoma represents the third section. In this genus the zygomatic arches reach anteriorly the remarkable development recorded in this paper, and the anterior zygotoma root is deeply recessed under a horizontal infraorbital platform.

Taking only dental characters into consideration, these results can be tabulated thus:—

Incisors $\frac{3}{1}$ —

Upper premolars oval, tuberculated *Nototherium, sensu stricto.*

Upper premolars subtriangular.

Cusp, single, transverse, with a shallow posterior cleft *Euryzygoma.*

Labial cusp extended antero-posteriorly "*Nototherium victoriae*
and *inermis*."

Incisors $\frac{2}{1}$ —

Upper premolar subtriangular *Euowenia.*

These dental characters are, of course, supplemented by other important features, as detailed elsewhere.

Nototherium inermis and *victoriae* were included by Lydekker (1887, p. 162) as synonyms of *N. mitchelli*, but the same author later (1889, p. 152) suggested that "*Nototherium dunense*" of De Vis was to be associated with *N. inermis*, and probably a distinct species. But *N. inermis* with its inconspicuous lower incisors cannot be associated with *N. dunense*, for the type mandible of the later species, although scarcely mature, is well armed with a large incisor. To resolve one as a sex variation of the other does not seem justifiable. Owen's maxillary heautotype of *N. inermis* as illustrated in Plate XLIII, and as described on p. 277 of the "Extinct Mammals of Australia," has a "triangular tract of dentine exposed extended antero-posteriorly," and is certainly not conspecific with the premolars in our cranium.

It may here be mentioned that G. Krefft used, in manuscript only, the name "*Zygomaturus macleayi*" for a perfect palate figured in Plate VII of his "Australian Fossil Remains," published in 1882 as a Parliamentary paper. We are indebted to Mr. C. Hedley for a copy of the unpublished explanation of the plates. The structure of the premolars cannot be satisfactorily defined from the illustration, but these teeth were evidently of the subtriangular type.

Scott and Lord (1920) have divided Nototherian crania into megacerathine and leptocerathine groups, but our specimens cannot be placed in their diagnostic tables. The wide nasals of *Euryzygoma* are associated with a parietal crest, with, of course, other discrepancies. The useful work done by the Tasmanian authors only applies to the material under their review.

Euowenia grata and *robusta* De Vis (1887 and 1891) are placed by Scott and Lord with *Nototherium tasmanicum*. They do not, however, give sufficient evidence for the association of the cranium and mandibles described by De Vis, with two upper incisors only on each side and a small subtriangular premolar, with *N. tasmanicum* with three pairs of incisors and a large oval premolar.

Scott and Lord (1920, p. 87) make the remarkable statement that *N. dunense* "really relates to *Phascolonus*." On the strength of the confusion between the genera *Sceparnodon* and *Phascolonus*, elucidated by Sterling (1913), they assume that "the claims of the type jaws of *dunense* to any genus other than that of *Phascolonus*, became remote." But the molars of *Phascolonus* are of the curved, rootless type of the Phascolomyidae, and the generic association with them of *N. duncense* with its bilophodont molars, talons, and separated fangs is unthinkable. Such unwarranted attempts to dispose of the species of previous authors are not in keeping with the value of the excellent work done by the Tasmanian authors on their own fine material.

Most of the difficulties which have arisen over the classification of Nototherian remains are due to the fact that the first four species were primarily described from incomplete mandibular elements. This is most unfortunate, for it is evident that the mandible does not carry specific characters in so marked a degree as does the cranium. As the years go by it is to be hoped that definitely associated bones will shed still further light on the several species of these quaint animals. Such an association might give us information as to the large and very wide humerus, incorrectly linked by Owen with his *Nototherium mitchelli*. It would not be altogether surprising if the wide-faced *Euryzygoma* were found to be equipped with such widened humeri.

In 1915, Scott (p. 45) suggested that the future might demonstrate two races of Nototheres, "one with humeri approaching the *Diprotodon* type, and the other approximating to the wombat type."

In its complex of characters *Euryzygoma* shows affinities with *Phascolarctus* (Native Bear), *Phascolomys* (Wombats), and *Macropus* (Kangaroos). The Nototherian group apparently arose from a common ancestry before the families represented by these three genera were differentiated. In his study of the evolution of the Australian Marsupialia, B. A. Bensley (1903, p. 159) notes *Nototherium* as representing one of the ancestral types leading towards *Diprotodon*. *Euryzygoma*, however, represents a specialised lateral offshoot which became extinct, and is another interesting instance of radial evolution.

FAMILY.—The genus *Diprotodon* was established by Owen in 1838, but the great palaeontologist did not define *Nototherium* until 1845. Most of the later writers have included both genera in one family. Should this be done, the term *Diprotodontidae* (Gill, 1872), as used by Bensley (1903) and W. K. Gregory (1910), has precedence over *Nototheriidae* (Lydekker, 1887), following the custom of using priority as a basis for family names. Lydekker (1887), however, recognised both families. When the skull of *Diprotodon* is more fully known, adequate evidence for this distinction may be forthcoming. As the crania of *Diprotodon* in the Queensland Museum are by no means complete, the

question cannot be dealt with in detail here. It may be pointed out that there are divergencies between the zygomata of *Diprotodon* (as illustrated by Owen) and those of *Nototherium* (as figured by Scott). But the relatively short squamosal and the oblique suture between it and the jugal in *Diprotodon*, as shown by Owen, are not present in our specimens. The relations of the jugal and squamosal in *Diprotodon* are evidently not very dissimilar from those in *Nototherium*, although the bones are relatively much more slender.

The scalpriform upper incisors of *Diprotodon* are very distinctive, and the whole cranium is, of course, much more elongated. These cranial distinctions may be supported by other evidence, and a full comparison of the two groups would be of great interest. At present, therefore, it seems best to retain the Family *Nototheriidae* for *Euryzygoma* with its closer allies, but Lydekker's definition of the premolar as "triangular, small" obviously must be extended to include the oval type present in *N. mitchelli* and *tasmanicum*.

Gill's work on the arrangement of Mammalian Families (1872) is not available to the writer, and the reference to *Diprotodontidae* has been taken from T. S. Palmer's useful Index Generum Mammalium, 1904.

HORIZON.—Comment on the stratigraphical relations of the locality of *Euryzygoma* is outside the scope of this paper, but reference may be made to authorities. The Geology and Palaeontology of Queensland (Jack and Etheridge, 1892) contains notes made by pioneer workers, and it will be seen that Brigalow, which is 190 miles from Brisbane on the Western Railway line, is within the "happy hunting grounds" noted (p. 605) by the late G. F. Bennett, the discoverer of *Mciolania*. Although the deposits have been referred to in this paper as Post-Tertiary, following these authorities, it has been pointed out by Professor Sir Edgeworth David that it is harder in Australia than in Northern Europe to separate Post-Tertiary from Tertiary rocks (1914, p. 285). Possibly the work being done in elucidating the nature of petrified wood, at the instigation of Mr. B. Dunstan, Chief Government Geologist, Queensland (1920), will ultimately afford more definite evidence as to the age of these Darling Downs remains.

CONCLUSION.—We are probably dealing with a group of large marsupials whose remains were deposited during a period of rapid evolution. A gradual alteration of climate from luxurious to more arid conditions, enforcing dietary changes, would afford stimuli resulting in marked variation. It seems to be a demonstrated fact that, when groups are approaching extinction, some of the members tend to assume bizarre characters. Many of the smaller marsupials evidently survived the climatic changes since early Pleistocene times because of their adaptability to a less luxurious diet and their mobility. When one realises the heavy toll taken from our herds to-day by a period of prolonged drought, it is easy to imagine a similar catastrophe bringing about the extermination of

such bulky and cumbrous animals as the *Diprotodon*, *Nototheriums*, and *Euryzygoma*. Be this as it may, it is certain that, had the wide-faced *Euryzygoma* survived until to-day, it would have shown to modern eyes one of the most remarkable types ever evolved among the mammalia.

Mr. T. C. Marshall, of the Museum staff, who assisted in the tedious work of putting together the fragments, found that a mixture of Portland cement and glue formed a most effective medium.

ACKNOWLEDGMENT.—The illustration of the reconstruction of the cranium (Text-fig. 1) is due to the enthusiasm and skill of Mr. O. W. Tiegs, B.Sc., Walter and Eliza Hall Fellow in Biology, Queensland University.

SPECIAL ACKNOWLEDGMENT.—Mr. G. H. Perry, who has taken a keen interest in Queensland fossils, has generously defrayed the cost of printing this part of the Queensland Museum Memoirs. The Director very heartily thanks Mr. Perry for his public-spirited action.

LIST OF PLATES.

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Plate V.—EURYZYGOMA DUNENSE (Frontal view).

Plate VI.—EURYZYGOMA DUNENSE (Ventral view).

Plate VII.—EURYZYGOMA DUNENSE (Dorsal view).

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AUSTRALIAN BEES IN THE QUEENSLAND MUSEUM.

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HYLEOIDES Smith.

Hyleoides striatula n. sp.

Female. Length about 12 mm., anterior wing 10 mm.; clypeus with a very broad orange band, broadest above, where it includes the whole width of clypeus, but ending abruptly some distance before the lower margin; two small transversely elongate orange spots on lower margin of supraclypeal area; lateral face-marks apparently paler, large, cuneiform; antennæ black, the flagellum faintly brownish beneath, extreme apex bright ferruginous; thorax and tegulæ entirely black; costal-field of anterior wings broadly dark fuliginous; legs black, anterior and middle tibiæ rufous in front, middle femora with a suffused red stripe, tarsi reddened at apex; first two abdominal segments entirely black; third orange suffused with red, the base black, with an angular projection in middle line and on each side, the projection of black in middle line approaching a narrow stripe from the hind margin, tending to divide the orange into two parts; fourth segment with two very large transverse orange patches, shaded with red outwardly; fifth black with an obscure orange mark on each side; sixth black; third ventral segment broadly margined with creamy white; first ventral segment nodulose, only about half depth of second, the latter basally truncate, with a broad smooth surface. It also differs from *H. concinna* (Fab.) by the distinctly shining mesothorax, with very minute punctures, and scattered large ones; by the strongly punctured scutellum; by the area of metathorax being distinctly striate in the middle above, and with its posterior face narrower, its outline like that of a convolvulus; by the shining finely punctured first two segments of abdomen, and by the clypeus being very delicately and densely longitudinally striate all over.

Kuranda, Queensland (*Dodd*). One female. A very distinct species, easily known by the sculpture and colour pattern.

Hyleoides bivulnerata n. sp.

Female. Length nearly 11 mm.; clypeus cream colour, with the lower margin black, and with a broad ferruginous band along each side except the upper part; lateral face-marks cuneiform, cream coloured, rather small, not extending below middle of clypeus; face narrowed below; scapa red, flagellum black; upper border of prothorax red, swollen and elevated, but tubercles black; a more or less semilunar red mark behind each tubercle; scutellum with two round red spots; postscutellum black; tegulæ piceous; costal region of wings fuliginous as usual; anterior femora swollen; anterior tibiæ mainly dark red; anterior tarsi peculiar, with much stiff

brush-like pale hair : middle and hind legs dark red clouded with black ; abdomen with weak rather sparse punctures, the surface feebly shining ; first segment red, with the base broadly black, and the hind margin at sides cream colour ; second segment very large, and black : third red, black at extreme base, and marked with cream colour apically, especially at sides ; remaining segments pale dull red ; third ventral segment with a very broad white band, abruptly contracted at sides. It also differs greatly from *H. concinna* by the extremely large and coarse, and partly confluent punctures on mesothorax ; the strong punctures on the shining scutellum ; the area of metathorax with a pair of large obtuse tubercles ; and the clear hyaline wings, aside from the dark costal region of anterior pair. The sculpture of the mesothorax is practically as in *H. waterhousei* Ckll. From *H. concinnula* Ckll. it is easily known by the dark tegulæ, scutellum with only red spots, &c.

Type from Darra, Brisbane, 26-10-15 (*Hacker*). Also one marked Brisbane, 23-11-15 (*Hacker*). The latter differs in having the ferruginous clypeal bands extending nearly to top of clypeus, and marked with a line of black, and in having a small red band along lower margin of supraclypeal area.

REEPENIA (Friese).

Reepenia eboracina (Cockerell).

A male from Gordonvale, North Queensland (no collector's name given), agrees with the type, which is from Cape York. The insect possesses a very remarkable character, hitherto overlooked ; the hind wings have a well-developed dark elongate-lanceolate stigma, not far from the apex. It is to be presumed that the same occurs in *R. variabilis* (Friese), the type of the genus, and I think I am accordingly justified in giving *Reepenia* full generic rank. It has hitherto been treated by Friese and myself as a subgenus of *Nomia*. The Australian *Tetralonia brevicornis* Smith is doubtless to be called *Reepenia brevicornis*.

NOMIA Latreille.

Nomia aurantifer swainsoniæ n. subsp.

Female (Type). Like *N. aurantifer*, but with a pale orange band, broadly interrupted in middle, on first abdominal segment ; mesothorax and scutellum with short pale grey, and larger fuscous hair ; hair of legs largely dull white, but black on outer face of middle tibiæ, hind knees, &c. ; wings dusky subhyaline, with the apical margin broadly darkened ; hair at sides of first abdominal segment white ; dense apical fringe on fifth segment dark chocolate, almost black ; venter with white hair.

Male. Similar, except for the usual sexual differences. Flagellum very long, strongly crenulated, black ; mandibles chestnut-red in middle ; face and front densely covered with cream-coloured hair ; mesothorax with much soft pale-grey hair ; tegulæ largely reddened ; knees and large part of hind tibiæ dark red : hind trochanters with an apical tuft of short red hair ; hind femora flat beneath, and

evidently swollen subapically; hind tibiae swollen, with a large apical finger-like projection but no spurs; abdomen with five orange bands, the first very slender and obsolescent in middle.

National Park, Queensland, December, 1919, both sexes at flowers of *Swainsonia galegifolia* R.Br. (*Häcker*). According to the Index Kewensis, *S. galegifolia* is a synonym of *S. coronillaefolia* Salisb. The four specimens before me (two of each sex) indicate that this is a distinct subspecies of *Nomia aurantifer* Ckll., 1910 (syn. *N. luteofasciata* Friese 1917).

***Nomia dimissa* n. sp.**

Male (Type). Like *N. australica reginae* Ckll., but smaller and more slender (length about 10.5 mm.), with hyaline wings, faintly dusky at apex; hair of face white, hardly perceptibly yellowish; abdomen dark blue; hind tibiae, seen from behind, with the inner margin strongly angulate below the middle; anterior lobe of hind tibiae much more broadly truncate. This is not *N. australica reginae* Ckll., from which it is at once known by the flagellum being ferruginous beneath, and the abdominal hair-bands strongly yellow.

Female. Length about 10 mm., robust, like *N. australica reginae*, but smaller, with a large red patch (triangular to subquadrate) on mesothorax in front. Clypeus black or with a very faint reddish stain; flagellum clear ferruginous beneath; disc of mesothorax shining; abdomen very dark, the hair-bands whitish, slightly stained with orange.

Cairns District, Queensland (*F. P. Dodd*). 2 ♀, 1 ♂. These are associated because they come from the same region and collector, but it is peculiar that the male wholly lacks the red mark on mesothorax, whereas I have a male *reginae* from Kuranda (*Turner*) which has it, though it is dull and inconspicuous. From the size and the colours of the abdomen, this male *reginae* cannot well be associated with the above females.

***Nomia kurandina* Cockerell.**

Logan Road, Brisbane, 18-9-11 (*Häcker*). One female.

CROCISA Jurine.

***Crocisa waroonensis* Cockerell.**

Two males, Swan R., W. Australia (*J. Clark*).

ANTHOPHORA Latreille.

***Anthophora pulchra* Smith.**

The abdominal bands vary greatly in colour. It would be interesting to determine whether the colours are at all uniform in any one colony:—

- (a) Bands turquoise blue. Female, Brisbane (7-12-15, *Häcker*). Recalls *A. chlorocyanea* Ckll.

- (b) Bands pale emerald green. Stradbroke Island ; both sexes (5-12-13, *Hacker*).
- (c) Bands pale brownish golden, with a few emerald-green hairs. Stradbroke Island ; male (3-12-12, *Hacker*).
- (d) Bands white tinged with brownish, the fourth pure white apically. Female. Tambourine Mountain (28-12-11, *Hacker*).

The specimen from Brisbane (*a*) also resembles *A. chlorocyanea* in having the hair of thorax above appearing pallid greyish, not strongly reddened ; but the legs are as in *pulchra*. The scape in female *chlorocyanea* is entirely black ; in *pulchra* (including *a*) it has a yellow stripe or mark.

***Anthophora lilacine* n. sp.**

Like *A. cingulata* Fab. (*emendata* Sm.), but abdominal bands pale lilac, the first two in the male suffused with ochreous. At first sight this appears to be a mere colour variation, but the fifth ventral segment of the male abdomen has a deep broad rounded emargination, instead of the very shallow one of *cingulata*. The hair on outer side of hind tibiæ is rich orange-fulvous, more or less white at apex.

Kuranda (*Dodd*). Both sexes ; the male is the type.

PROSOPIDIDÆ.

***Prosopis sculptifrons* n. sp.**

Male (Type). Length about 11.5 mm. ; robust, black, with cream-coloured markings on head and legs, and bright orange markings (tubercles, scutellum, and postscutellum) on thorax. Head very broad, entirely cream-colour on face below antennæ, and lateral face-marks extending nearly to top of orbits, ending very obtusely away from orbits, while the supraclypeal mark is triangularly extended upward between the antennæ ; labrum light, and mandibles with an elongate light mark sometimes broken into two ; scape greatly swollen, broadly cream-colour in front, flagellum dusky chestnut-red beneath ; mandibles small bidentate ; front with a very strong keel, on each side of which is a deep sulcus for the scape to rest in ; the frontal keel, in a less elevated form, extends downward, to flatten out on apical part of clypeus ; supraclypeal area enormously extended laterally, bounding upper part of sides of clypeus, and its convex sides invading the region of lateral marks, and approaching the orbits ; vertex and lower part of cheeks with dark hair ; mesothorax rather finely and closely punctured, but shining between the punctures ; scutellum finely punctured, with a faint median groove ; area of metathorax without evident sculpture ; metathorax obtusely subtuberculate on each side of truncation ; wings dusky, darker in marginal cell and at apex, stigma and nervures piceous ; b.n. arched, meeting t.m. ; second s.m. very long, receiving the recurrent nervures not far from base and apex ; tegulæ black ; anterior and middle femora broadened, largely cream colour in front ; anterior and middle tibiæ, anterior basitarsi, and middle basitarsi in part cream colour in front ; abdomen shining, finely punctured ; no ventral tubercles.

Female. Looks just the same, seen from above, but the legs, scape, mandibles, and labrum are entirely black, the flagellum also is black, while the light area on face is bright orange, and is confined to a hat-like supraclypeal mark, and a broad pyriform area on clypeus, including its whole upper end, narrowing below, and ending very obtusely just above clypeal margin.

National Park, Queensland, Dec., 1919, four of each sex (*Hacker*). I thought this might be a *meroglossa*, but the second segment of the female abdomen has not the *meroglossa* base, and the male has not the pointed *meroglossa* tongue, but is a pollen-eater, as a microscopic preparation shows. The female *Palæorhiza*, and doubtless also *meroglossa*, feed on pollen, but the male must be a nectar-feeder. Thus the differences in the tongue are apparently adaptive.

The female *P. sculptifrons* runs in my table of Australian *Prosopis* (*Ann. Mag. Nat. Hist.* Feb. 1910) to *P. morosa* Smith, to which it is closely allied, differing by the flagellum not being fulvous beneath, and the apical margins of the abdominal segments not discoloured. *P. morosa* is a Southern species from Victoria. Its male is unknown.

Prosopis certa n. sp.

Male (Type). Length about 8 mm. ; black, robust, with the whole face below antennæ, and lateral face-marks ending a short distance above (on orbits, at an angle of about 50 degrees), large spot on labrum, tubercles, scutellum, and postscutellum, all very bright lemon-yellow ; face broad ; mandibles black ; tongue very broad and emarginate ; cheeks with white hair ; scape ordinary, black, punctured ; flagellum long, submoniliform, red beneath ; face dull and pitted ; mesothorax dull and coarsely punctured ; tegulæ piceous with a small pale-yellow spot ; wings hyaline ; b.n. falling short of t.m., first r.n. meeting first t.c., second s.m. long ; anterior tibiæ broadly, and middle ones narrowly, fulvous in front ; all the basitarsi white ; under side of thorax hoary with white hair ; abdomen shining but rough, with punctures of two sizes ; a strong constriction at junction of first and second segments ; apical margin of first ventral segment slightly elevated in middle.

Female. Similar, differing thus :—Labrum entirely black ; face-marks confined to broad lateral marks, their upper ends very broad and rounded, a short distance above level of antennæ ; legs black, with anterior tibiæ fulvous in front ; first r.n. joining first s.m. a little before its end ; end of abdomen with black hair. The second abdominal segment is irregularly punctured, the punctures of different sizes.

Brisbane (*Hacker*). Type male 10-10-16 ; female 12-2-18. In my table, the male runs to 51, and falls with *P. elongata* Sm., from which it is easily separated by the sculpture. The female runs out at 53, disagreeing in the form of the lateral face-marks.

Prosopis daveyi n. sp.

Female. Length about 9 mm. ; black, robust, with large lateral face-marks, tubercles and very large areas on scutellum and postscutellum very brilliant orange ; flagellum ferruginous beneath. The lateral face-marks fill the space between the high

narrow clypeus and the eye, and are squarely truncate at level of antennæ, except that there is a short projection on the outer side, along the orbit; clypeus with shallow punctures; mesothorax densely punctured, but shining on disc; mesopleura rather sparsely punctured; orange area on scutellum broadly triangular, the corners obtuse; postscutellum orange except at extreme sides; tegulæ black; wings greyish hyaline; b.n. meeting t.m.; second s.m. receiving the recurrent nervures very near base and apex; legs black; abdomen moderately shining, finely and regularly punctured, the punctures rather sparse on first segment, denser on second, very close on third; black hair at sides of apex. Base of metathorax rugose.

"Bright V." (*H. W. Dacey*). Very close to *P. simillima* Sm., but the face-marks differ, and the face is broad, while the scutellum is only partly yellow.

***Palæorhiza viridifrons* n. sp.**

Female. About 9 mm. long or rather over, robust; black, with the front, mesothorax, metathorax, and mesopleura green and purple, the metallic colour only conspicuous under a lens; first abdominal segment bluish green, especially the depressed shining hind margin; head without light markings; flagellum dusky ferruginous beneath; scutellum (but not axillæ), postscutellum, tubercles, and a very large patch behind them, all bright orange; clypeus elongate, longitudinally striate, and sparsely irregularly punctured; a shining area on each side between antennæ and eyes; front densely punctured; ocelli in a triangle; mesothorax densely and distinctly punctured; area of metathorax beautifully green and purple, without evident sculpture; tegulæ black; wings brownish, stigma ferruginous, nervures fuscous; b.n. nearly meeting t.m.; second s.m. receiving both recurrent nervures, the first a considerable distance from base, the second bent strongly backward; legs black; abdomen shining, the first segment finely punctured, densely at sides, the third very much more closely punctured than the second, the latter also with a small dull punctureless area in basal middle; venter with coarse punctures. Hind spur simple.

Brisbane, 25-5-16 (*Hacker*). Although I have only the female, I am confident that this is a *Palæorhiza*. It runs in my key to *P. parallela* Ckll., from which it is easily known by the general colouration and the dark face.

The above new species, and others with yellow or orange on scutellum and postscutellum, may be separated by the following table. I include *Euryglossa aurantifera* Ckll., which was taken by Mr. Hacker at Brisbane, 8-10-18, as it superficially resembles the others. The specimen of *P. aureomaculata subnubilosa* taken by Mr. Hacker has the first recurrent nervure joining the apical corner of first submarginal cell, but the venation in this species is variable. Mr. Meade-Waldo (in litt.) expressed the opinion that *Prosopis nubilosa* Smith should be referred to *Palæorhiza*, with *subnubilosa* as a subspecies. The rediscovery of *Prosopis quadrata* Smith, described from "New Holland," is of interest. The specimen was taken by Mr. Hacker at Oxley, Brisbane, 17-9-14, at *Leptospermum* ?] flowers. It has the minutely

reticulated area of metathorax described by Smith. The first recurrent nervure reaches the basal corner of the second submarginal cell, but this character doubtless varies. *P. elongata* Smith is certainly very close, and perhaps not a distinct species; I now have no *elongata* to compare.

An orange patch behind tegulate; no light marks on face; first abdominal segment	
metallic <i>Palæorhiza viridifrons</i> Ckll.	
No orange or yellow mark behind tegulæ	1.
1. Face with only minute light marks (National Park, Queensland, Dec., 1919, <i>Hacker</i>)	
<i>Prosopis nubilosella mediosticta</i> Ckll., ♀.	
Face with conspicuous light marks, or all light	2.
2. No lateral face-marks	<i>P. sculptifrons</i> Ckll., ♀.
With lateral face-marks	3.
3. Clypeus all dark	4.
Clypeus not all dark	5.
4. Mesothorax posteriorly closely punctured	<i>P. daneyi</i> Ckll., ♀.
Mesothorax posteriorly dull and sparsely punctured	<i>P. certa</i> Ckll., ♀.
5. Clypeus with only a light spot (National Park, Q., Dec., 1919, <i>Hacker</i>)	<i>P. aureomaculata</i> Ckll., ♀.
Clypeus light, or nearly all light	6.
6. Scape entirely black	7.
Scape light in front	9.
7. Clypeus low and broad; abdomen slightly purplish; yellow patches above tubercles	
<i>Euryglossa aurantifera</i> Ckll.	
Clypeus high and narrow	8.
8. Lateral face-marks going above level of antennæ	<i>Prosopis certa</i> Ckll., ♂.
Lateral face-marks not going above level of antennæ	<i>P. quadrata</i> Smith.
9. Face very narrow; small species	10.
Face broad; large species	<i>P. sculptifrons</i> Ckll., ♂.
10. No supraclypeal mark (Brisbane, 6-10-14, <i>Hacker</i>)	<i>P. aureomaculata subnubilosa</i> Ckll., ♂.
Supraclypeal mark present (Brisbane, 26-2-18, <i>Hacker</i>)	<i>P. aureomaculata</i> Ckll., ♂.

The following table separates a series of species which are at least partly metallic, and the scutellum and postscutellum are not yellow. The specimens of *P. albonitens* average larger than those from Mackay—

Thorax black; face entirely black (six from Bribie I., Nov. 1918, <i>Hacker</i>)	
<i>Prosopis cyanocomicans nigrescens</i> Ckll.	
Thorax metallic	1.
1. Supraclypeal mark present (three from Stradbroke I., Sept. 17, 1915, <i>Hacker</i> ; one Bribie I., Jan. 1917, <i>Hacker</i>)	<i>P. albonitens</i> Ckll., ♂.
Supraclypeal mark absent	2.
2. Clypeus entirely dark; females (two from Stradbroke I., Sept., 17, 1915, <i>Hacker</i>)	<i>P. albonitens</i> Ckll.
Clypeus at least mainly light; males (Brisbane, 1-9-14 and 8-2-16, <i>Hacker</i> ; Stradbroke I., 2-10-11, <i>Hacker</i>)	
<i>P. disjuncta</i> Ckll.	

PARASPHECODES Smith.

Parasphecodes callomelittinus Cockerell, 1910.

This remarkable species was described from Melbourne. One from Bribie Island, 2-11-15 (*Hacker*), differs a little in having the tegulae reddish, not dark, and the stigma paler than in the type.

CALLOMELITTA Smith.

Callomelitta littleri Cockerell 1914.

Mr. Hacker collected three females and two males of *Callomelitta* in the National Park, Queensland, Dec., 1919. To my surprise, the females are *C. littleri*, and the males *C. nigrofasciata* Ckll., both described from Tasmania. In spite of the differences which led me to regard *nigrofasciata* as a distinct species, I can no longer doubt that it is the male of *littleri*.

MEGACHILE Latreille.

Megachile semiluctuosa Smith.

Mallee, Victoria (*H. W. Davey*). One female.

Megachile mackayensis Cockerell.

National Park, Queensland, Dec., 1919 (*Hacker*). Two females, which have a short line of red hair sublaterally on each side of second and third abdominal segments, in addition to the bright red hair of the apical three segments.

Megachile quinquelineata Cockerell.

Kuranda, Queensland (*Dodd*). One female.

Megachile sequior Cockerell.

Eidsvold (*T. L. Bancroft*). One male.

Megachile canifrons Smith.

Brisbane, 10-10-16 (*Hacker*). One male. Described from Western Australia, but the specimen from Brisbane agrees with the description. It also runs to *canifrons* in Meade-Waldo's table of Smith's species.

Megachile tasmanica Cockerell.

Brisbane, 10-10-16 (*Hacker*). This little species was described from Tasmania in 1916. The male from Brisbane exactly agrees with the type.

Megachile latericauda n. sp.

Male (Type). Length about 11 mm., expanse 17; black, with a large apical patch on inner side of anterior tibiae, and anterior tarsi entirely, bright ferruginous; head rounded, with broad vertex; eyes reddish; face narrow, covered with long white hair, that on upper part of clypeus tinged with yellow; mandibles black, strongly bidentate; vertex finely and densely punctured; antennae black, slender,

not at all expanded at apex (a character separating the species from the related *M. ferox* Sm.); vertex and disc of thorax, including anterior part of scutellum, with dark chocolate hair; hair of occiput, cheeks, thorax anteriorly and posteriorly and at sides, white; mesothorax finely and densely punctured; legs with white hair, fulvous on inner side of hind tarsi; spurs black; anterior tarsi moderately expanded, with a large white area in the middle posteriorly, presenting on the under side a large elongate black mark broadly surrounded by white; third joint also with an elongated lateral lobe; anterior trochanters pointed beneath; anterior coxæ densely covered with white hair in front, not spined; tegulæ black, closely punctured; wings dusky translucent; abdomen parallel-sided, closely punctured; first segment with long white hair; second and third with white hair-bands, broadly interrupted in middle; fourth with a bright ferruginous hair-band, failing at sides; fifth densely covered with bright-red hair, except at extreme sides; sixth without red hair, its transverse keel with two broad rounded lobes, the margins of which are more or less irregular or nodulose.

Female. Face with white hair, but some red hair at apex of clypeus and on mandibles subapically; mandibles tridentate, the outer face strongly grooved; clypeus simple and ordinary, very densely punctured; flagellum obscurely reddish beneath; conspicuous tufts of white hair next to the four corners of mesothorax, and pale hair along its posterior border; wings very smoky; legs entirely black; abdominal segments 1 to 3 with narrow (linear) white hair-bands, expanding into triangular patches at sides of first segment; fifth and sixth segments covered with deep coppery-red hair except at sides; ventral scopa entirely white.

Swan River, W. Australia, one of each sex (*J. Clark*). Near to *M. ferox* but easily separated by the male antennæ, which are like those of *M. erythropyga* Sm., a species having entirely different male tarsi. The female resembles *M. heliophila* Ckll., but differs by the colour of the hair at end of abdomen, the entirely opaque mesothorax, the much more finely punctured clypeus, and the minutely and very densely punctured supraclypeal area. The male carries numerous mites on the posterior part of thorax.

***Megachile ciliatipes* n. sp.**

Male. Length about 9 mm.; extremely near *M. kurandensis* Ckll., but differing thus:—No evident spot of pale hair in front of axillæ; no red or fulvous hair on disc of fifth abdominal segment; anterior tarsi incrassate, especially the basitarsus, and with a fringe of stiff white hair behind; middle tarsi (which in *kurandensis* have black hair on outer side and red on inner, with no white) with silky white hair on outer side, and a very long white fringe behind; hind tarsi with long white hair on each side. The anterior coxæ are spined; face and front densely covered with golden hair; cheeks with pure white hair, tinged with yellow on upper part; vertex and discs of mesothorax and scutellum with black hair; a conspicuous band of pale hair between mesothorax and scutellum; tegulæ black; wings dusky; abdomen with narrow pale fulvous hair-bands, disc of sixth segment above densely covered with fulvous hair.

Type (with pea-green eyes) from Brisbane, 9-4-18 (*Hacker*). Also one (with dark-red eyes, but otherwise the same) from Kuranda (*Dodd*).

***Megachile hæmatogastra* n. sp.**

Female. Length about 11.5 mm., robust, black; ventral scopa bright ferruginous, black on last segment and pale yellow at extreme base; abdomen finely punctured, not at all metallic, segments 2 to 5 with narrow entire fulvous hair-bands; eyes dark reddish: face and front with bright fulvous hair, not covering the clypeus; mandibles broad, dark reddish subapically; clypeus normal, except that the lower margin is thickened and somewhat elevated, and the upper part of disc is convex, highly polished and shining, sparsely punctured, while the lower part is distinctly longitudinally striate, with punctures between the striæ; lower part of supraclypeal area exposed and shining; antennæ black; cheeks with fulvous hair, vertex with black; mesothorax and scutellum finely and extremely densely punctured, the scutellum obtusely pointed at apical middle; thorax with fulvous hair, but short and black on disc of mesothorax, longer and black on scutellum (but a fulvous band between the two), and blackish on disc of mesopleura; tegulæ black; wings dusky; legs black, with partly pale and partly dark hair, on middle basitarsi; dark reddish on outer side, but clear red on inner; hind basitarsi broad, with very bright red hair covering inner side; hind tibiæ with short black hair on outer side, and whitish on inner.

Cairns District (*F. P. Dodd*). Very distinct from the known Australian species, and rather approaching *M. shortlandi* Ckll., from the Solomon Islands.

***Megachile mundifica* n. sp.**

Female. Length about 11.5 mm.; parallel-sided but rather robust; black, including legs, antennæ, and tegulæ; eyes blackish; head thick and rounded; sides of face, front, and the broad cheeks with abundant white hair; vertex with scanty brownish hair; mandibles broad, quadridentate, the base covered with appressed pale silky hair; clypeus coarsely and closely punctured, the middle with a very large squared excavation, within which are golden hairs, and on each side of which the margin has the aspect of a broad rounded lobe; vertex, mesothorax, and scutellum very closely and densely punctured, but glistening; scutellum and disc of mesothorax with red-brown hair; a tuft of clear white hair above the base of each wing; only a very faint hair-band (hardly noticeable) between mesothorax and scutellum; sides of thorax with white hair; wings dusky; legs with white hair, pale reddish on inner side of tarsi; hind basitarsi not broadened; abdomen with creamy-white hair-bands on first three segments, on first interrupted sublaterally and represented at sides by large triangular patches: from apical margin of fourth segment to end the abdomen is covered with pale fulvous hair, redder along margins of fourth and fifth segments; ventral scopa entirely white.

National Park, Queensland, Dec., 1919 (*Hacker*). Resembles *M. recisa* Ckll.,

known only in the male, but I feel confident that it is not that species. Among the known females it resembles *M. simpliciformis* Ckll., but the clypeus is entirely different.

GASTROPSIS Smith.

Gastropsis victoriæ rufocollaris n. subsp.

Male. Length about 14 mm.; face and front covered with bright ferruginous hair; eyes yellowish green; first three antennal joints clear ferruginous; scape somewhat swollen; mesothorax and scutellum somewhat metallic; anterior part of mesothorax with bright fox-red hair, abruptly separated from the black of the hinder part; anterior tibiæ red in front and black behind; abdominal segments 2 and 3 with white hair-bands along their posterior margins, failing in middle.

Mallee, Victoria (*H. W. Davey*). Two males. The position of *Gastropsis* has been in doubt, but it certainly belongs to the subfamily Diphaglossinæ.

STENOTRITUS Smith.

Stenotritus elegantior n. sp.

Female. Length about 16 mm.; similar to *S. elegans* Sm., but with the following special characters:—Head and thorax above metallic, with rich purple and green tints; hair of face and front fulvous, of cheeks white, contrasting; scape entirely bright ferruginous; legs with long white hair, pale brown on anterior tibiæ and tarsi (red on inner face of tarsi), brownish on middle tarsi and partly so on tibiæ, chocolate colour on inner side of hind tibiæ and tarsi (the basitarsi very broad); abdomen steel-blue, with white hair-bands, interrupted in middle, on first four segments; fifth segment with a heavy rusty-black fringe, the apical middle of which is bright red. The mesothorax and scutellum have black hair on disc, but the mesothorax anteriorly is broadly covered with white hair, having a faint creamy tint.

Queensland, "Hy. 330." From the label, I suspect it is a Turner specimen, from the Mackay region.

PARACOLLETES Smith.

Paracolletes melbournensis Cockerell.

"Bright V." (*H. W. Davey*).

Paracolletes carinatus Smith.

Kuranda (*Dodd*). One male. The very rich purple colour of abdomen may indicate a distinct race, as one would expect from the locality.

Paracolletes plumosus Smith.

"Bright V." (*H. W. Davey*). One female. Hamel, W. Australia, one male. The details of the venation are variable, but I cannot distinguish more than one species.

Paracolletes truncatulus Cockerell.

Stradbroke I., Queensland, 9-9-11.

Paracolletes obscurus Smith.

Kosciusko, 26-1-14 (*A. J. Turner*). The wings are not so brown as in specimens from Mt. Wellington, Tasmania.

Paracolletes chalcurus n. sp.

Female. Length a little over 12 mm.; head and thorax olive-green, bluish green on pleura and sides of face; clypeus strongly but rather sparsely punctured, black, with less than the upper third green; abdomen brassy yellow suffused with crimson, the hind margins of first four segments brilliantly crimson; mandibles black; scape black, long, and curved; flagellum ferruginous at apex, and beneath with the last three joints red and the others marked with red; hair of face, cheeks, and sides of thorax pale grey, of vertex long and blackish, of thorax above long and tinged with fulvous, especially laterally, but partly blackened on disc of mesothorax and scutellum, there being also a vague blackish transverse band from side to side anterior to the tegulae; mesothorax roughened and closely punctate in front, but the disc posteriorly polished, with few punctures; scutellum polished anteriorly; area of metathorax transversely keeled, with two or three transverse sulci above the keel, but fine oblique and irregular striae or raised lines below it; tegulae fulvous, wings hyaline; stigma bright amber colour, nervures dilute sepia; venation as described for *P. roseoviridis*; legs black, with small joints of anterior tarsi, middle and hind tarsi entirely, and hind tibiae, all reddish; tibial scopa large and loose, whitish below, blackish above; abdomen without hair-bands; first segment with long dull white hair, in middle tinged with ochreous; apex with blackish hair, but tawny on each side of the apical plate, the sides of which are concave; venter with white hair.

Cunderdin, W. Australia, Nov., 1913 (*R. Illidge*). This is very like *P. roseoviridis* Ckll., described from a male about 8 mm. long, and it is possible that the two are sexes of one species. As there is so much difference in size, and the sculpture of the metathorax is not quite the same, I provisionally regard the present insect as distinct.

Paracolletes boroniæ n. sp.

Female. Length about 11 mm.; head and thorax black, abdomen peacock-green, quite brilliant and beautiful, with a rather satiny gloss; hair of head and thorax long, dorsally grey mixed with black, laterally and beneath mainly dull whitish, more or less blackened on clypeus and sides of face; mandibles black; clypeus shining, strongly and rather closely punctured; front dull, somewhat glistening at sides; antennae black, clear red at extreme apex, and the flagellum very obscurely brownish beneath; mesothorax dull in front but the disc shining, with sparse punctures; area of metathorax dullish with an obtuse transverse ridge, but no keel or distinct sculpture; tegulae piceous; wings dusky, stigma and nervures

piceous ; b.n. meeting t.m. ; first r.n. joining second s.m. considerably before middle ; legs black ; tibial scopa black above, white below ; abdomen without bands, first segment with thin white hair, apex with black hair, venter with white hair.

Brisbane, 5-9-16 (*Hacker*). Taken at Birkdale, on flowers of *Boronia ledifolia* Gay, much like *P. viridicinctus* Ckll., but the abdomen is quite a different shade of green. *P. viridicinctus* is a Tasmanian species. It may also be compared with *P. versicolor* Sm., but the hair on under side of abdomen is not at all yellow, and there are other differences.

Paracolletes regalis n. sp.

Male. Length about 10 mm. ; head and thorax black, abdomen shining deep rich purple, without hair bands ; hair of head and thorax dorsally rusty black, but on sides of face, cheeks, and sides of throat white ; mandibles black ; clypeus exposed, finely and regularly punctured ; antennæ long, black, the flagellum very faintly brownish beneath ; mesothorax and scutellum polished, with sparse punctures, weak on mesothorax ; scutellum with a shallow median sulcus ; area of metathorax without evident sculpture, dullish, except the obtuse transverse ridge, which is shining ; tegulæ dark reddish ; wings dusky, stigma and nervures piceous ; b.n. meeting t.m. ; second r.n. greatly narrowed above, receiving first r.n. in middle ; legs black ; abdomen with some black hair apically, and thin white hair on ventral surface.

Kuranda Queensland (*Dodd*). There is a strong brown cloud in the marginal cell and beyond, but it is not at all sharply defined. There is no such cloud in the related *P. recusus*, described below.

Paracolletes facialis n. sp.

Male. Length nearly 9 mm., slender ; head, thorax, legs, mandibles, antennæ (which are rather short for a male) and tegulæ black ; abdomen shining very dark purplish, with the depressed hind margins of segments more reddish ; vertex and discs of mesothorax and scutellum with black hair, but head and thorax otherwise with long white hair, at sides of face dense, appressed, and pure white ; clypeus thinly covered with long hair, but the convex shining distinctly punctured surface visible ; front dull ; mesothorax and scutellum shining, with very weak sparse punctures ; scutellum with a distinct median sulcus ; area of metathorax mainly shining, without a distinct transverse ridge, but with very delicate cross-striæ ; wings faintly dusky, nervures and stigma fuscous ; b.n. falling short of t.m. ; second s.m. not greatly narrowed above, receiving first r.n. much before the middle ; marginal cell obliquely truncate at end ; third s.m. very long ; legs with white hair ; end of abdomen with some black hair.

Coolangatta, Queensland, 15-8-16 (*A. J. Turner*). Resembles *P. regalis* in many respects, but easily separated by the wings. It is extremely like *P. nitidulus* Ckll., but that has a pure black abdomen.

Paracolletes plebeius n. sp.

Female. Length about 10 mm. or a little over; head, thorax, mandibles, and legs black, abdomen shining dark purplish; flagellum dusky chestnut red beneath, except at base; hair of vertex, mesothorax, and scutellum black, other hair of head and thorax white; hair at apex of abdomen black; clypeus somewhat shining but not polished, with scattered large punctures; disc of mesothorax shining, with very sparse feeble punctures; scutellum rather strongly but sparsely punctured, with a median sulcus; area of metathorax dull; tegulae black; wings faintly dusky, not clouded, stigma and nervure dark reddish; b.n. meeting t.m.; second s.m. very broad below, receiving first r.n. at or a little before the middle; tibial scopa black above, white beneath; venter of abdomen with white hair.

"Bright V." (*H. W. Davey*). Very near to *P. providus* Sm., but the head is smaller, the flagellum is differently coloured, and the dark purplish colour of the abdomen is quite different. From *P. frontalis* Sm. it is known by the colour of the scopa.

The next two species are very close to *P. plebeius*, so that at first I hesitated whether to consider them variations of a single species, or to consider all three races of *providus*. I believe, however, that they are really distinct.

Paracolletes incomptus n. sp.

Female. Length about 9 mm.; similar to *P. plebeius*, but smaller, surface of clypeus polished, antennae entirely dark; wings shorter, quite strongly brownish; stigma with a dark margin, contrasting with the paler centre; scutellum quite without a median sulcus; area of metathorax shining on and below the transverse ridge, but above dullish, with a shallow median groove, and weak transverse striae; abdomen dark greenish, the same colour as that of *P. providus*, but less polished.

Mundaring, W. Australia, Nov., 1913 (*R. Illidge*). This is easily known from *P. providus* by the smaller size and brownish wings.

Paracolletes recusus n. sp.

Female. Length about 10 mm.; similar to *P. plebeius*, with median sulcus on scutellum and hyaline wings, but antennae black, surface of clypeus polished, and area of metathorax shining. The abdomen is broad, the segments basally black, with the broad apical margins dark greenish, suggesting the Tasmanian *P. viridicinctus* Ckll., which is, however, quite distinct. There is much resemblance to *P. hackeri* Ckll.,

from which it differs by the dull anterior half of mesothorax, the total absence of ochreous hair in front of tegulae, the shining area of metathorax, and the differently coloured abdomen, the segments of which are more broadly depressed apically, and are not distinctly punctured as in *hackeri*.

Tambourine Mountain, Queensland, 27-10-12 (*Hacker*).

Paracolletes apicalis n. sp.

Female. Length about 8 mm., slender for a female; head, thorax, legs, and antennae black; mandibles with a red subapical spot, and with the inner tooth very

slightly developed; tegulae black, with a brown spot; wings greyish, nervures and stigma piceous; first abdominal segment shining black, without evident punctures, the depressed apical margin chestnut-red; second to fourth segments chestnut-red, black at extreme sides (more widely on second), and the hind margins blackish (broadly black on fourth); fifth segment black, distinctly punctured, the depressed hind margin red, but covered with black hair; apical plate very broad, red in middle. Clypeus shining, strongly but not densely punctured; hair of head and thorax thin, dull white, but dark fuscous on scutellum, vertex, and more or less on mesothorax; front dull except along orbital margins, but laterad of the ocelli the surface is polished and impunctate; mesothorax and scutellum finely and closely punctured, the scutellum without any smooth spaces; area of metathorax with a subsericeous surface, with a delicate median keel, but no distinct transverse ridge or sulci, the surface under the microscope being minutely tessellated; b.n. falling a short distance short of t.m.; second s.m. receiving first r.n. beyond middle; third s.m. long; anterior tibiae and tarsi with red hair on inner side; tibial scopa thin, blackish above, white below; abdomen dullish, with white hair at sides, and a very imperfectly developed white hair-band on fourth segment, but fifth with black hair.

Swan River, W. Australia, Oct., 1919 (*J. S. Clark*). Not closely related to any known species.

***Paracolletes specularis* n. sp.**

Male. Length about 9 mm.; black, including legs, mandibles, and the thick moniliform antennae; hair of head and thorax dull white, dorsally grey or blackish; middle of front supraclypeal area and clypeus polished and shining, the front with a strong median keel, the supraclypeal area with a faint one, but the middle of clypeus broadly depressed, impunctate and without a keel. Resembles *P. incanescens* Ckll., from Brisbane, but differs thus:—Clypeus and front as just described; area of metathorax very distinctly transversely striate (as in *P. perpolitus* Ckll.); hind tarsi black; abdomen dull, especially basally, the surface microscopically tessellate, with scattered very fine punctures. The venation is nearly as in *P. incanescens*. The wings are greyish.

National Park, Queensland, Dec., 1919 (*Hacker*). One male. Known from *P. perpolitus* Ckll., by the entirely dark antennae, entirely black anterior tibiae, &c.

***Paracolletes nomadiformis* n. sp.**

Male. Length about 6.5 mm., abdomen clavate, with narrowed base. Head and thorax black, but lower edge of supraclypeal area, broad clypeal band, and lower part of clypeus broadly ferruginous; clypeus shining, with weak punctures; mandibles dark reddish; antennae long, entirely ferruginous, the flagellum not moniliform; front and vertex dull; sides of face and front with long pale fulvous hair; mesothorax entirely dull, with very little hair, except a dense fulvous patch at each anterior corner; tubercles covered with fulvous hair, and also scutellum and postscutellum, forming a large dorsal orange-fulvous patch, as in *P. flavomaculatus* Ckll.; area of metathorax dull, without evident sculpture; tegulae ferruginous; wings reddish, with a darker cloud in marginal cell and beyond; b.n. meeting t.m.,

first r.n. joining second s.m. before middle; stigma large, fulvous, nervures light fuscous; knees, tibiæ, and tarsi clear ferruginous, hind basitarsi very long; abdomen dull black, with first segment at base and very broadly at apex, and the remaining segments apically, fulvo-ferruginous.

Kuranda, Queensland (*Dodd*). A very distinct species, with the aspect of a *Nomada*. I have thought it permissible, in forming the specific name, to avoid a diphthong in the middle.

***Paracolletes aurescens* n. sp.**

Male. Length about 11 mm.; black, with the long (not moniliform) flagellum light fulvo-ferruginous beneath, the hind margins of the first five abdominal segments broadly reddish-testaceous, and the anterior and middle knees, anterior tibiæ in front and at apex, middle tibiæ at apex and base, hind tibiæ narrowly at apex and broadly at base, and all the tarsi, clear ferruginous. Apical half of mandibles dark reddish; face and front up to and surrounding anterior ocellus, densely covered with long orange-fulvous hair, the uppermost hairs forming a long erect fringe, concealing the lateral ocelli; cheeks with long white hair; thorax above with pale fulvous hair, becoming bright fox-red in front of tegulæ; posteriorly and on sides of thorax the hair is paler, but not white; disc of mesothorax and scutellum shining, with scattered rather small punctures; area of metathorax polished and shining, weakly transversely striate above; tegulæ clear ferruginous; wings clear, faintly dusky apically; nervures and the small narrow stigma dark fuscous; b.n. falling just short of t.m.; second s.m. very broad, receiving first r.n. before the end of its first third; legs with pale hair; anterior femora swollen, with a large oblong depression beneath; discs of abdominal segment with a good deal of pale ochreous-tinted hair; a long silvery-white fringe on each side of apical plate; venter with thin bands of pale fulvous hair.

Bribie Island, Queensland, 1-4-18 (*Hacker*). Allied to *P. colletellus* Ckll., but much longer. On account of the structure of the metathorax, it cannot be the male of *P. waterhousei* Ckll. It is also probably allied to *P. humerosus* Sm., but certainly not its male.

***Paracolletes fallax* n. sp.**

Female. Length about 9 mm.; black, punctured, looking like an *Halictus*, and with the basal nervure strongly arched. Hair of head and thorax short, prevailing greyish, light reddish on vertex and scutellum, and more or less on mesothorax, tubercles fringed with white hair; mandibles black, inner tooth small; head broad; clypeus broad and flat, with large oval punctures, which are densely placed in middle; front coarsely and very densely punctured; antennæ black, the short flagellum reddish beneath apically; mesothorax and scutellum densely and rather coarsely punctured, but shining between the punctures; postscutellum with a median tuft of spreading hair; area of metathorax with irregular oblique rugæ, especially at sides; tegulæ piceous, partly rufous on outer side; wings strongly dusky, nervures and stigma piceous; b.n. meeting t.m.; second s.m. receiving first r.n. in middle; marginal cell obliquely truncate at end; second s.m. broad, but third

a little broader above than second; anterior tibiæ and tarsi with red hair beneath; hind tibial scopa black or blackish above, white beneath; legs, black; abdomen closely and finely punctured; second segment depressed basally; hind margins of segments brown, the third and fourth with shaggy white hair-bands, placed submarginally, the second with bands at sides, and the first with only lateral patches; fifth segment with short fuscous hair, but the usual heavy fringe is absent; pygidial plate large, with convex sides.

Bribie Island, Queensland, 2-11-13 (*Hacker*). Related to *P. punctatus* Sm., but easily separated by the colour of stigma and nervures.

***Paracolletes scitulus* n. sp.**

Male. Length about 8 mm.; black, with hind margins of abdominal segments very obscurely reddish; anterior knees, apical part of femora in front, and their tibiæ in front, all clear ferruginous; middle femora reddened at apex, and their tibiæ at base in front; hind femora and tibiæ and all the tarsi black, except that basal half of anterior basitarsi is red, and the apical joint on all the tarsi is clear red; head broad, with shining white hair at sides of face; middle of front polished and shining (not at all so in *P. nitidulus* Ckll.), vertex also shining; supraclypeal area dull; clypeus convex finely punctured; antennæ long, not moniliform, flagellum (except basal joint) dark brown beneath; cheeks with long white hair; mesothorax dullish, with scattered very weak punctures, but posteriorly shining; scutellum polished and shining, impunctate in middle, with very weak punctures toward the side; area of metathorax convex, shining, without striæ or keel, but the surface is microscopically roughened; abdomen shining, with long white hair on first segment, but without bands; hair at apex pale reddish. There is long dull white hair at sides of thorax posteriorly.

Brisbane, Queensland, 25-9-19 (*Hacker*). One male. Resembles *P. speculiferus*, but easily separated by the clypeus. Superficially, it could be taken for *P. incanescens* Ckll., which also occurs at Brisbane, but the clypeus is different, and the b.n. falls short of t.c., instead of meeting it as in *incanescens*. In both, the first r.n. joins second s.m. in middle, and the tegulæ are alike in both, or perhaps rather redder in *scitulus*.

The following key will facilitate the separation of the species of *Paracolletes* recorded above:—

At least abdomen more or less metallic	1.
Non-metallic species	9.
1. Thorax metallic	2.
Thorax black	4.
2. Abdomen brassy, suffused with crimson; comparatively large species ..	<i>chalcurus</i> Ckll.
Abdomen olive-green	<i>Melbournensis</i> Ckll.
Abdomen blue or purple	3.
3. Mesothorax purple, with a green area on disc posteriorly	<i>carinatus</i> Smith
Mesothorax green	<i>plumosus</i> Smith.
4. Abdomen bright green	<i>boronæ</i> Ckll.

- | | | |
|---|---------|---------------------------|
| Abdomen dark or purple | .. .. . | 5. |
| 5. Marginal cell and beyond with a strong brown cloud ; abdomen rich purple | | <i>regalis</i> Ckll. |
| Marginal cell, &c., not thus clouded | .. .. . | 6. |
| 6. Male, with brilliant white hair on each side of face | .. .. . | <i>facialis</i> Ckll. |
| Females | .. .. . | 7. |
| 7. Antennæ with flagellum dull red beneath ; area of metathorax dull ; abdomen purplish | .. | <i>plebeius</i> Ckll. |
| Antennæ with flagellum dark ; area of metathorax shining | .. .. . | 8. |
| 8. Wings brownish ; scutellum with no median sulcus | .. .. . | <i>incomptus</i> Ckll. |
| Wings clear ; scutellum with a shallow median sulcus | .. .. . | <i>recusus</i> Ckll. |
| 9. Abdomen with at least the middle segments red | .. .. . | 10. |
| Abdomen with the middle segments not red | .. .. . | 11. |
| 10. Abdomen entirely red | .. .. . | <i>truncatulus</i> Ckll. |
| Abdomen black at base and apex | .. .. . | <i>apicalis</i> Ckll. |
| 11. Abdomen clavate, with broad ferruginous bands | .. .. . | <i>nomadiformis</i> Ckll. |
| Abdomen otherwise | .. .. . | 12. |
| 12. Face with bright golden-fulvous hair | .. .. . | <i>aurescens</i> Ckll. |
| Face with largely black hair | .. .. . | <i>obscurus</i> Smith |
| Face with white hair | .. .. . | 13. |
| 13. Abdomen rough and closely punctured ; hind margins of segments broadly brown | | <i>fallax</i> Ckll. |
| Abdomen smoother and feebly punctured | .. .. . | 14. |
| 14. Clypeus ordinary, convex | .. .. . | <i>scitulus</i> Ckll. |
| Clypeus depressed and polished in middle | .. .. . | <i>speculiferus</i> Ckll. |

CATALOGUE OF AUSTRALIAN BEES.

BY HENRY HACKER, F.E.S.

THE number of bees described from Australia is now very large, being no less than 872 species contained in 50 genera. The list compiled by W. W. Froggatt and published by the Linnean Society of N. S. Wales in 1892 contained 196 species distributed through 31 genera. In this catalogue references of a general character, field notes, or biological notes, are omitted, only those being given which contain the descriptions of each species, or which deal with the systematic position of these species. The arrangement of divisions and families is taken from the Classification of Rocky Mountain Bees, by Professor T. D. A. Cockerell and W. W. Robbins,† while the genera and species are arranged alphabetically. The species marked with an asterisk are represented in the Museum collection; with these species also are included all the localities from which the Museum series were obtained. A few species described by F. Smith cannot, after 68 years, be given a more exact habitat than "New Holland," but the majority have been rediscovered and a larger range of localities is now known.

Order HYMENOPTERA.

Suborder HETEROPHAGA.

Superfamily APOIDEA.

Division COLLETIFORMES.

Family COLLETIDÆ.

Genus ANTHOGLOSSA, Sm., MSS., Cat. Hym. B.M., pt. 1, p. 16, 1853.

Anthoglossa aureotincta Ckll., The Entomologist, xxix, p. 16, 1906.

Hab. : Western Australia.

Anthoglossa cygni Ckll., Ann. Mag. Nat. His. (7), xiv, p. 203, 1904.

Hab. : Swan River, W.A.

Anthoglossa dives Ckll., Ann. Mag. Nat. His. (8), xiv, p. 39, 1914, ♀ ♂.

Hab. : Yallingup, W.A.

***Anthoglossa hackeri** Ckll., Ann. Mag. Nat. His. (8), xii, p. 373, 1913, ♀.

Hab. : Mt. Tambourine, Q.

Anthoglossa plumata Sm., Cat. Hym. B.M., pt. 1, p. 16, 1853.

Hab. : Western Australia.

Anthoglossa sericea Sm., Trans. Ent. Soc. Lond. (3), i, p. 59, 1862-64, ♀.

Hab. : Australia.

Genus CLADOCERAPIS, Ckll., Ent. News. Philad., xv, p. 292, 1904.

***Cladocerapis bipectinatus** (Sm.) Genotype.*Lamprocolletes bipectinatus* Sm., Trans. Ent. Soc. Lond. Proc., p. 31, 1856.*Lamprocolletes cladocerus* Sm., Trans. Ent. Soc. Lond. (3), p. 57, 1862, ♂.*Cladocerapis bipectinatus* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 393, 1905.

Hab. : Caloundra, Bribie Island, Q.

† University of Colorado Studies, vol. vii, No. 3, p. 179, 1910.

Genus GONIOCOLLETES. Ckll., Bull. Amer. Mus. Nat. His. xxiii, p. 231, 1907.

Goniocolletes morsus Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 231, 1907, ♂.
Genotype.

Hab. : New South Wales.

Goniocolletes pallidus Ckll., Ann. Mag. Nat. His. (8), xv, p. 345, 1915, ♂.

Hab. : Hermannsburg, Cent. Aust.

Genus NOTOCOLLETES, Ckll., Ann. Mag. Nat. His. (8), xviii, p. 44, 1916.

Notocolletes heterodoxus Ckll., Ann. Mag. Nat. His. (8), xviii, p. 44, 1916, ♂.

Hab. : Gawler Range, S.A.

Genus PARACOLLETES Sm., MSS. Cat. Hym. B.M., pt. 1, p. 6, 1853.

Paracolletes abdominalis Sm., New Sp. Hym. B.M., p. 5, 1879, ♀.

Hab. : Champion Bay, W.A.

Paracolletes abnormis Ckll., Ann. Mag. Nat. His. (8), xviii, p. 46, 1916, ♂.

Hab. : Alexandria, N. Austr.

***Paracolletes advena** (Sm.).

Andrena advena Sm., Trans. Ent. Soc. Lond. (3), i, p. 60, 1862-64, ♀.

Paracolletes advena Ckll., Ann. Mag. Nat. His. (8), iv, p. 314, 1909.

Hab. : Brisbane, Stradbroke Island, Q.

Paracolletes amabilis (Sm.).

Lamprocolletes amabilis Sm., New Sp. Hym. B.M., p. 9, 1879, ♀.

Paracolletes amabilis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 481, 1905, ♀.

Hab. : Queensland.

Paracolletes andreniformis Ckll., Ann. Mag. Nat. His. (8), xv, p. 344, 1915, ♀.

Hab. : Yallingup, W.A.

Paracolletes antennatus (Sm.).

Lamprocolletes antennatus Sm., New Sp. Hym. B.M., p. 10, 1879, ♂.

Hab. : Swan River, W.A.

***Paracolletes apicalis** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 94, 1921, ♀.

Hab. : Swan River, W.A.

Paracolletes argentifrons (Sm.).

Lamprocolletes argentifrons Sm., New Sp. Hym. B.M., p. 11, 1879, ♂.

Paracolletes argentifrons Ckll., var. A, Trans. Amer. Ent. Soc., xxxvi, p. 204, 1910.

Hab. : Swan River, W.A.

Paracolletes atronitens Ckll., Ann. Mag. Nat. His. (8), xiv, p. 48, 1914, ♂.

Hab. : Yallingup, W.A.

***Paracolletes aurescens** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 96, 1921, ♂.
Hab. : Bribie Island, Q.

Paracolletes aurifrons (Sm.).

Lamprocolletes aurifrons Sm., Cat. Hym. B.M., i, p. 13, 1853, ♂.
Hab. : Adelaide, S.A.

Paracolletes bicolor (Sm.).

Lamprocolletes bicolor Sm., New Sp. Hym. B.M., p. 10, 1879, ♀.
Paracolletes bicolor Ckll., var. A, Trans. Amer. Ent. Soc., xxxvi, p. 201, 1910, ♂.
Paracolletes bicolor Ckll., Ann. Mag. Nat. His. (8), xiv, p. 47, 1914.
Hab. : Swan River, W.A.

Paracolletes bimaculatus (Sm.).

Lamprocolletes bimaculatus Sm., New Sp. Hym. B.M., p. 10, 1879, ♀.
Paracolletes bimaculatus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 478, 1905, ♂.
Paracolletes bimaculatus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 47, 1914, ♂.
Hab. : Swan River, Perth, Yallingup, W.A.

***Paracolletes boroniæ** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 92, 1921, ♀.
Hab. : Birkdale, near Brisbane.

***Paracolletes cæruleotinctus** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 480, 1905, ♂.
Var. A, Trans. Ent. Soc. Amer., xxxvi, p. 204, 1910, ♂.
Hab. : Kuranda, Mackay, Brisbane, Q.

Paracolletes callander Ckll., Ann. Mag. Nat. His. (8), xv, p. 343, 1915, ♀ ♂.
Hab. : Yallingup, W.A.

Paracolletes callurus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 40, 1914, ♀.
Hab. : Yallingup, W.A.

***Paracolletes carinatus** (Sm.).

Lamprocolletes carinatus Sm., Cat. Hym. B.M., i, p. 11, 1853, ♀.
Paracolletes carinatus Ckll., P.L.S. N.S.W., xxxvii, p. 597, 1912, ♂.
Paracolletes carinatus Ckll., Ann. Mag. Nat. His. (8), xi, p. 281, 1913.
Paracolletes carinatus Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 91, 1921.
Hab. : Bathurst, N.S.W.; Nagambie, V.; Kuranda, Q.; Tasmania.

Paracolletes carinatus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 481, 1905, ♂; Bull
Amer. Mus. Nat. His., xxiii, p. 230, 1907, ♀.
Hab. : N. S. Wales; Mackay, Q.

Paracolletes castaneipes Ckll., Ann. Mag. Nat. His. (8), xiv, p. 47, 1914, ♂.
Hab. : Yallingup, W.A.

***Paracolletes chalcurus** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 92, 1921, ♀.
Hab. : Cunderdin, W.A.

***Paracolletes chalybeatus** (Er.).

Andrena chalybeata Erich., Arch. f. Naturg., viii, i, p. 268, 1842, ♀.

Lamprocolletes chalybeatus Sm., Cat. Hym. B.M., i, p. 11, 1853.

Lamprocolletes chalybeatus Sichel., Reise. d. Navarra. Zool., ii, i, p. 144, 1867, ♂.

Hab. : Tasmania.

Paracolletes cinereus (Sm.).

Lamprocolletes cinereus Sm., Cat. Hym. B.M., i, p. 12, 1853, ♀.

Hab. : South Australia.

Paracolletes clypeatus Ckll., Ann. Mag. Nat. His. (8), xviii, p. 52, 1916, ♂ ♀.

Hab. : Yallingup, W.A.

Paracolletes colletellus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 485, 1905, ♂.

Hab. : Adelaide River, N.T.

***Paracolletes crassipes** Sm., Cat. Hym. B.M., i, p. 6, 1853, ♀; Ckll., Ann. Mag. Nat. His. (8), ix, p. 378, 1912, ♂.

Hab. : Swan River, W.A.; Leura, Sydney, N.S.W.; Brisbane, Caloundra, Bribie Island, Q.

Paracolletes crassipes leptospermi Ckll., Ann. Mag. Nat. His. (8), ix, p. 378, 1912, ♂.

Hab. : Mackay, Q.

Paracolletes cristatus (Sm.).

Lamprocolletes cristatus Sm., Cat. Hym. B.M., i, p. 11, 1853, ♀.

Hab. : Australia.

Paracolletes cupreus (Sm.).

Lamprocolletes cupreus Sm., Cat. Hym. B.M., i, p. 13, 1853, ♀.

Hab. : Adelaide, S.A.

Paracolletes dentiger Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 199, 1910, ♀; Ann. Mag. Nat. His. (8), xiv, p. 41, 1914, ♂ ♀.

Hab. : Yallingup, W.A.

Paracolletes elegans (Sm.).

Leioproctus elegans Sm., Cat. Hym. B.M., i, p. 9, 1853, ♀.

Hab. : Adelaide, S.A.

Paracolletes erythrurus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 5, 1914, ♂ ♀.

Hab. : Yallingup, W.A.

Paracolletes eucalypti Ckll., Ann. Mag. Nat. His. (8), xviii, p. 51, 1916, ♂.

Hab. : Mt. Yule, Healsville, V.

Paracolletes eugeniarum Ckll., Ann. Mag. Nat. His. (8), ix, p. 380, 1912, ♀.

Hab. : Mackay, Q.

- ***Paracolletes euphenax** Ckll., Ann. Mag. Nat. His. (8), xi, p. 279, 1913, ♂.
Hab. : Brisbane, Cleveland, Q.
- ***Paracolletes facialis** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 93, 1921, ♂.
Hab. : Coolangatta, Q.
- ***Paracolletes fallax** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 96, 1921, ♀.
Hab. : Bribie Island, Q.
- Paracolletes ferricornis** Ckll., Ann. Mag. Nat. His. (8), xviii, p. 52, 1916, ♂.
Hab. : Hermannsburg, Cent. Aust.
- Paracolletes fervidus** Sm., New Sp. Hym. B.M., p. 4, 1879, ♀.
Hab. : Australia.
- Paracolletes fervidus subdolos** Ckll., Ann. Mag. Nat. His. (8), xi, p. 279, 1913, ♀.
Hab. : Cheltenham, V.
- Paracolletes fimbriatinus** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 202, 1910, ♂.
Hab. : Victoria.
- Paracolletes fimbriatinus hillieri** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 47, 1914, ♂.
Hab. : Hermannsburg, Cent. Aust.
- Paracolletes fimbriatus** (Sm.).
Lioproctus fimbriatus Sm., New Sp. Hym. B.M., p. 6, 1879, ♀.
Hab. : ?
- ***Paracolletes flavomaculatus** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 479, 1905, ♂ ;
Trans. Amer. Ent. Soc., xxxvi, p. 201, 1910, ♀.
Hab. : Cairns, Kuranda, Stradbroke Island, Q.
- Paracolletes frederici** Ckll.
Dasycolletes rubellus Sm., Trans. Ent. Soc. Lond. (3), i, p. 58, 1862-64, ♀.
Lamprocolletes rubellus Sm., Trans. Ent. Soc. Lond., p. 253, 1868, ♂.
Paracolletes frederici Ckll., Trans. Amer. Ent. Soc. Philad., xxxi, p. 313-364, 1905.
Paracolletes frederici Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 229, 1907, ♀.
Hab. : New South Wales ; West Australia.
- Paracolletes frontalis** (Sm.).
Leioproctus frontalis Sm., Cat. Hym. B.M., i, p. 9, 1853, ♀.
Hab. : Australia.
- Paracolletes fulvus** Sm.
Lamprocolletes fulvus Sm., New Sp. Hym. B.M., p. 9, 1879, ♀.
Hab. : Queensland.
- Paracolletes gallipes** Ckll., Ann. Mag. Nat. His. (8), xi, p. 280, 1913, ♀.
Hab. : Poonarunna, S.A.

***Paracolletes hackeri** Ckll., Mem. Queensl. Mus., vi, p. 112, 1918, ♀.

Hab. : Birkdale, Q.

Paracolletes halictiformis Ckll., Proc. Acad. Nat. Sc. Philad., p. 365, 1916, ♀.

Hab. : Yallingup, W.A.

***Paracolletes helichrysi** Ckll., Mem. Queensl. Mus., vi, p. 112, 1918, ♀.

Hab. : Mt. Tambourine, Q.

Paracolletes hobartensis Ckll., Ann. Mag. Nat. His. (7), xvii, p. 23, 1906, ♀.

Hab. : Hobart, T.

Paracolletes humerosus (Sm.).

Dasycolletes humerosus Sm., New Sp. Hym. B.M., p. 11, 1879, ♀.

Hab. : Melbourne, V.

Paracolletes humerosus cyanurus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 140, 1914, ♀.

Hab. : Oakley, V.

Paracolletes ibex Ckll., Ann. Mag. Nat. His. (8), xiii, p. 138, 1914, ♂.

Hab. : Windsor, V.

***Paracolletes incanescens** Ckll., Ann. Mag. Nat. His. (8), xi, p. 277, 1913, ♀ ♂.

Hab. : Brisbane, Stradbroke Island, Q.

***Paracolletes incomptus** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 94, 1921, ♀.

Hab. : Mundaring, W.A.

Paracolletes irroratus (Sm.).

Lamprocolletes irroratus Sm., Cat. Hym. B.M., i, p. 12, 1853, ♀.

Hab. : Port Phillip, V.

***Paracolletes latifrons** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 41, 1914, ♀.

Hab. : Coolangatta, Q.

Paracolletes launcestonensis Ckll., The Entomologist, p. 305, 1914, ♀.

Hab. : Launceston, T.

***Paracolletes leai** Ckll., Proc. Linn. Soc. N.S.W., xxxvii, p. 597, 1912 ; Ann. Mag. Nat. His. (8), xii, p. 373, 1913, ♀.

Hab. : King Island, Ulverstone, T. ; Wilson's Promontory.

***Paracolletes marginatus** Sm., New Sp. Hym. B.M., p. 4, 1879, ♀ ♂ ; Ckll., Ann. Mag. Nat. His. (8), xi, p. 274, 1913 ; The Entomologist, p. 305, 1914.

Hab. : Bright, Cheltenham, V. ; Bridport, T.

Paracolletes megachalceus Ckll., Ann. Mag. Nat. His. (8), xii, p. 374, 1913, ♀.

Hab. : Clarence River, N.S.W.

***Paracolletes megadontus** Ckll., Ann. Mag. Nat. His. (8), xii, p. 375, 1913, ♀.

Hab. : Caloundra, Stradbroke Island, Bribie Island, Q.

***Paracolletes melbournensi** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 205, 1910, ♀;
Ann. Mag. Nat. His. (8), xi, p. 281, 1913.

Hab. : Melbourne, Rutherglen, V.

Paracolletes metallescens Ckll., Ann. Mag. Nat. His. (8), xiv, p. 44, 1914, ♀ ♂.

Hab. : Yallingup, W.A.

Paracolletes mimulus Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 206, 1910, ♀.

Hab. : Victoria.

Paracolletes minutus Ckll., Ann. Mag. Nat. His. (8), xviii, p. 50, 1916, ♂.

Hab. : Yallingup, W.A.

Paracolletes moniliformis Ckll., Ann. Mag. Nat. His. (8), xviii, p. 51, 1916, ♂.

Hab. : Yallingup, W.A.

Paracolletes moretonianus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 477, 1905, ♂.

Hab. : Moreton Bay, Q.

Paracolletes nanus (Sm.).

Lamprocolletes nanus Sm., New Sp. Hym. B.M., p. 9, 1879, ♀.

Hab. : Western Australia.

Paracolletes nigrutilus Ckll., Ann. Mag. Nat. His. (8), xviii, p. 48, 1916, ♀.

Hab. : Yallingup, W.A.

Paracolletes nigrocinctus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 6, 1914, ♂.

Hab. : Yallingup, W.A.

Paracolletes nigroclypeatus Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 204, 1910, ♀.

Hab. : Victoria.

Paracolletes nigrofulvus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 137, 1914, ♂.

Hab. : Shoalhaven, N.S.W.

Paracolletes nitidulus Ckll., Ann. Mag. Nat. His. (8), xviii, p. 46, 1916, ♀ ♂.

Hab. : Yallingup, W.A.

Paracolletes nitidus Sm., New Sp. Hym. B.M., p. 3, 1879, ♀.

Hab. : N. W. Coast of Australia.

***Paracolletes nomadiformis** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 95, 1921, ♀.

Hab. : Kuranda, Q.

Paracolletes obscuripennis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 484, 1905, ♂.

Hab. : Tasmania.

***Paracolletes obscurus (Sm.).**

Lamprocolletes obscurus Sm., Cat. Hym. B.M., p. 11, 1853, ♀♂.

Paracolletes obscurus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 307, 1905, ♀.

Hab. : Western Australia ; Mt. Wellington, T. ; Mt. Kosciusko, V.

Paracolletes pachyodontus Ckll., Ann. Mag. Nat. His. (8), xv, p. 529, 1915, ♂.

Hab. : Yallingup, W.A.

Paracolletes perfasciatus Ckll., Ann. Mag. Nat. His. (7), xvii, p. 25, 1906.

Hab. : Western Australia.

Paracolletes perpolitus Ckll., Ann. Mag. Nat. His. (8), xviii, p. 49, 1916, ♂.

Hab. : Yallingup, W.A.

Paracolletes platycephalus Ckll., Ann. Mag. Nat. His. (8), ix, p. 379, 1912, ♀ ; Ann.

Mag. Nat. His. (8), xi, p. 276, 1913, ♂.

Hab. : Windsor, V.

***Paracolletes plebeius Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 94, 1921, ♀.**

Hab. : Bright, V.

Paracolletes plumosellus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 480, 1905, ♂.

Hab. : Australia.

***Paracolletes plumosus (Sm.).**

Lamprocolletes plumosus Sm., Cat. Hym. B.M., i, p. 12, 1853, ♀.

Paracolletes plumosus Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 200, 1910, ♂.

Hab. : Swan River, W.A. ; Melbourne, Bright V.

Paracolletes providellus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 483, 1905, ♂.

Hab. : Australia.

Paracolletes providellus bacchalis Ckll., Ann. Mag. Nat. His. (8), xiii, p. 138, 1914, ♂.

Hab. : Bacchus Marsh, Windsor, V.

Paracolletes providus (Sm.).

Lamprocolletes providus Sm., New Sp. Hym. B.M., p. 8, 1879, ♀.

Paracolletes providus Ckll., var. A, Trans. Ent. Soc. Amer. xxxvi, p. 203, 1910, ♀.

Paracolletes providus Ckll., Ann. Mag. Nat. His. (8), xvi, p. 104, 1915, ♂.

Hab. : Port Phillip, V. ; Eaglehawk Neck, T.

Paracolletes punctatus (Sm.).

Lamprocolletes punctatus Sm., Cat. Hym. B.M., i, p. 14, 1853, ♀.

Hab. : Adelaide, S.A.

Paracolletes rebellis Ckll., Ann. Mag. Nat. His. (8), ix, p. 379, 1912, ♂.

Hab. : Melbourne, Woodend, V.

- ***Paracolletes recusus** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 94, 1921, ♀.
Hab. : Mt. Tambourine, Q.
- ***Paracolletes regalis** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 93, 1921, ♂.
Hab. : Kuranda, Q.
- Paracolletes rhodopus** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 46, 1914, ♀.
Hab. : Yallingup, W.A.
- Paracolletes rudis** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 25, 1906, ♀.
Hab. : Swan River, W.A.
- Paracolletes ruficornis** (Sm.).
Lamprocolletes ruficornis Sm., New Sp. Hym. B.M., p. 10, 1879, ♀.
Hab. : Western Australia.
- ***Paracolletes scitulus** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 97, 1921, ♂.
Hab. : Brisbane, Q.
- Paracolletes semilautus** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 485, 1905, ♂.
Hab. : Australia.
- ***Paracolletes semipurpureus** Ckll.
Paracolletes cupreus semipurpureus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 479, 1905, ♀.
Paracolletes cupreus semipurpureus Ckll., var. *A*, Trans. Amer. Ent. Soc., xxxvi, p. 203, 1910, ♀.
Paracolletes semipurpureus Ckll., var. *B*, Ann. Mag. Nat. His. (8), xiii, p. 139, 1914, ♀.
Hab. : Rutherglen, V. ; Mackay, Brisbane, Bribie Island, Q.
- ***Paracolletes semipurpureus ornatissimus** Ckll., Mem. Queensl. Mus., v, p. 200, 1916, ♀ ♂.
Hab. : Oxley, near Brisbane, Q.
- Paracolletes sexmaculatus** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 43, 1914, ♀ ♂.
Hab. : Yallingup, W.A.
- Paracolletes sigillatus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 139, 1914, ♀.
Hab. : South Australia.
- Paracolletes simillimus** Ckll., Ann. Mag. Nat. His. (8), xviii, p. 48, 1916, ♂.
Hab. : Yallingup, W.A.
- Paracolletes subfuscus** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 26, 1906, ♂.
Hab. : Adelaide, S.A.

- Paracolletes subvigilans** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 45, 1914, ♀.
Hab. : Yallingup, W.A.
- Paracolletes subviridis** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 103, 1915, ♀.
Hab. : Bridport, T.
- ***Paracolletes speculiferus** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 95, 1921, ♂.
Hab. : National Park, Q.
- ***Paracolletes tenuicinctus** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 42, 1914, ♀.
Hab. : Yallingup, W.A.
- ***Paracolletes thornleighensis** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 27, 1906, ♂ ;
Ann. Mag. Nat. His. (8), xi, p. 278, 1913, ♂ ; Ann. Mag. Nat. His. (8),
xiv, p. 42, 1914, ♀.
Hab. : Thornleigh, N.S.W. ; Brisbane, Caloundra, Kuranda, Q.
- ***Paracolletes truncatulus** Ckll., Ann. Mag. Nat. His. (8), xi, p. 275, 1913, ♀.
Hab. : Blackwood, N.S.W.
- Paracolletes tuberculatus** Ckll., Ann. Mag. Nat. His. (8), xi, p. 274, 1913, ♀ ♂.
Hab. : Cheltenham, V.
- ***Paracolletes tuberculatus insularis** Ckll., Ann. Mag. Nat. His. (8), xi, p. 275, 1913,
♀ ♂.
Hab. : Stradbroke Island, Bribie Island, Q.
- ***Paracolletes turneri** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 203, 1910, ♀.
Hab. : Rutherglen, V. ; Mackay, Brisbane, Q.
- Paracolletes versicolor** (Sm.).
Lamprocolletes versicolor Sm., Cat. Hym. B.M., i, p. 14, 1853, ♀.
Paracolletes spatulatus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 483, 1905, ♂.
Paracolletes versicolor Ckll., Ann. Mag. Nat. His. (8), xv, p. 529, 1915.
Hab. : Blackheath, N.S.W. ; Adelaide, S.A. ; Mt. Wellington, T.
- ***Paracolletes vigilans** (Sm.).
Lioproctus vigilans Sm., New Sp. Hym. B.M., p. 7, 1879, ♀.
Paracolletes vigilans Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 199, 1910.
Hab. : Swan River, W.A. ; Launceston, T.
- Paracolletes viridicinctus** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 482, 1905, ♀.
Hab. : Tasmania.
- Paracolletes vitrifrons** (Sm.).
Dasycolletes vitrifrons Sm., New Sp. Hym. B.M., p. 11, 1879, ♂.
Hab. : Swan River, W.A.
- Paracolletes waterhousei** Ckll., Trans. Amer. Ent. Soc. Philad., xxxi, p. 313-364,
1905 ; Trans. Amer. Ent. Soc. Philad., xxxvi, p. 204, 1910, ♂
Hab. : Victoria.

Paracolletes worsfoldi Ckll., Ann. Mag. Nat. His. (7), xvii, p. 24, 1906, ♀.

Hab. : Western Australia.

Genus PHENACOLLETES Ckll., Ann. Mag. Nat. His. (7), xvi, p. 301, 1905.

Phenacolletes mimus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 302, 1905, ♂. Genotype.

Hab. : Turtle Bay, N. W. Coast, Australia.

Genus TETRALONIA, Spin. Ann. Soc. Ent. Fr., vii, 1838.

Tetralonia convicta Ckll., Ann. Mag. Nat. His. (8), iv, p. 310, 1909, ♂.

Hab. : Port Phillip, V.

Genus TRICHOCOLLETES Ckll., The Entomologist, xlv, p. 176, 1912.

***Trichocolletes venusta** (Sm.). Genotype.

Lamprocolletes venustus Sm., Trans. Ent. Soc. Lond. (3), i, p. 57, 1862, ♀.

Trichocolletes venusta Ckll., Ann. Mag. Nat. His. (8), xi, p. 273, 1913, ♀.

Hab. : Brisbane, Birkdale, Q.

Family PROSOPIDIDÆ.

Genus BINGHAMIELLA Ckll., Bull. Amer. Mus., xxiii, p. 235, 1907.

***Binghamiella antipodes** (Sm.). Genotype.

Sphecodes antipodes Sm., Cat. Hym. B.M., i, p. 37, 1853, ♀.

Sphecodes antipus Sichel, Ann. Ent. Fr. (4), v, p. 451, 1865.

Binghamiella antipodes Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 235, 1907, ♀.

Hab. : Sydney, N.S.W. ; Caloundra, Stradbroke Island, Q.

***Binghamiella antipodes insularis** Ckll., Proc. Acad. Nat. Sc. Philad., p. 363, 1916,

♂ ♀.

Binghamiella insularis Ckll., The Entomologist, p. 199, 1914, ♂.

Hab. : George Town, Eaglehawk Neck, T.

Genus CALLOMELITTA Sm., MSS. Cat. Hym. B.M., i, p. 85, 1853.

***Callomelitta littleri** Ckll., The Entomologist, p. 305, 1914, ♀.

Callomelitta nigrofasciata Ckll., Ann. Mag. Nat. His. (), i, p. 164, 1918, ♂.

Callomelitta littleri Ckll. Mem. Queensl. Mus., vi, pt. 3, p. 88, 1921.

Hab. : Launceston, T. ; National Park, Q. ; Ebor, N.S.W.

Callomelitta picta Sm., Cat. Hym. B.M., i, p. 85, 1853, ♀ ♂ ; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 294, 1905 ; Ckll., Ann. Mag. Nat. His. (8), viii, p. 289, 1911.

Hab. : Melbourne, V. : Magnet, T.

Callomelitta picta perpicta Ckll., Jour. New York Ent. Soc., xviii, p. 100, 1910, ♂.
Hab. : Ararat, V.

Callomelitta rugosa Ckll., Ann. Mag. Nat. His. (8), xv, p. 345, 1915, ♀.
Hab. : Queensland.

Callomelitta turnerorum Ckll., Ann. Mag. Nat. His. (8), vi, p. 356, 1910, ♀.
Hab. : Cairns, Kuranda, Q.

Genus **EUPROSOPIS** Perk., Ann. Mag. Nat. His. (8), ix, p. 106, 1912.

***Euprosopis elegans** (Sm.).

Prosopis elegans Sm., Cat. Hym. B.M., p. 28, 1853, ♀ ♂.

Prosopis sydneyana Ckll., Ann. Mag. Nat. His. (7), xvi, p. 467, 1905, ♂.

Prosopis elegans Ckll., Ann. Mag. Nat. His. (8), iv, p. 395, 1909.

Euprosopis elegans Perk., Ann. Mag. Nat. His. (8), ix, p. 108, 1912.

Hab. : Timboon, V. ; Kenthurst, Wellington, N.S.W. ; Brisbane, Q. ; Adelaide, S.A.

Euprosopis elegans huseloides (Ckll.).

Prosopis elegans huseloides Ckll., Ann. Mag. Nat. His. (8), v, p. 498, 1910, ♀.

Euprosopis elegans huseloides Perk., Ann. Mag. Nat. His. (8), ix, p. 108, 1912.

Hab. : Townsville, Q.

Euprosopis husela (Ckll.).

Prosopis husela Ckll., Ann. Mag. Nat. His. (8), v, p. 498, 1910, ♀ ♂.

Euprosopis husela Perk., Ann. Mag. Nat. His. (8), ix, p. 107, 1912, ♂.

Hab. : Townsville, Q.

Euprosopis nodosicornis Ckll., Proc. Acad. Nat. Sc. Philad., p. 43, 1913, ♂.

Hab. : Australia.

Genus **EURYGLOSSA** Sm., MSS. Cat. Hym. B.M., pt. i, p. 17, 1853 ; Perk., Ann. Mag. Nat. His. (8), ix, p. 109, 1912.

Euryglossa adalaidæ Ckll., Ann. Mag. Nat. His. (7), xvi, p. 475, 1905, ♀.

Hab. : Adelaide, S.A.

Euryglossa albocuneata Ckll., Ann. Mag. Nat. His. (8), xii, p. 510, 1913, ♀.

Hab. : Windsor, V.

Euryglossa altitudinis Ckll., The Entomologist, p. 213, 1914, ♂ ♀.

Hab. : Mt. Lofty, S.A.

***Euryglossa anthraccephala** Ckll., Insecutor Inscitiae Menstruus, ii, p. 99, 1914, ♀.

Hab. : Brisbane, Q.

Euryglossa apicalis Ckll., Ann. Mag. Nat. His. (8), xii, p. 511, 1913, ♂.

Hab. : Croydon, V.

- *Euryglossa aurantifera** Ckll., Ann. Mag. Nat. His. (8), ix, p. 143, 1912, ♀.
Hab. : Sydney, N.S.W. ; Brisbane, Q.
- Euryglossa aurescens** Ckll., Ann. Mag. Nat. His. (8), xii, p. 509, 1913, ♀.
Hab. : Mackay, Q.
- Euryglossa bicolor** Sm., Trans. Ent. Soc. Lond. (3), i, p. 58, 1862-64, ♀.
Hab. : Adelaide, S.A.
- Euryglossa blanda** Sm., New Sp. Hym. B.M., p. 13, 1879, ♀.
Hab. : Western Australia.
- Euryglossa brachycera** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 7, 1914, ♀.
Hab. : Townsville, Q.
- Euryglossa calliopsella** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 208, 1910, ♀; Ann. Mag. Nat. His. (8), viii, p. 290, 1911, ♂.
Hab. : Victoria ; Sydney, N.S.W.
- Euryglossa calliopsiformis** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 293, 1905, ♀; The Entomologist, p. 213, 1914, ♂.
Hab. : Mackay, Q.
- Euryglossa carnosa** Ckll., Proc. Acad. Nat. Sc. Philad., p. 33, 1913, ♀.
Hab. : Purnong, S.A.
- *Euryglossa chrysoceras** Ckll., Jour. New York Ent. Soc., xviii, p. 99, 1910; Trans. Amer. Ent. Soc., xxxvi, p. 209, 1910, ♂; Ann. Mag. Nat. His. (8), vi, p. 168, 1910, ♂.
Hab. : Victoria ; Adelaide, S.A. ; Mackay, Brisbane, Q.
- Euryglossa cincticornis** Ckll., Ann. Mag. Nat. His. (8), xii, p. 511, 1913, ♂.
Hab. : Warburton, V.
- *Euryglossa crabronica** Ckll., The Entomologist, p. 142, 1914, ♀.
Hab. : Brisbane, Q.
- Euryglossa cupreo-chalybea** Sm., Cat. Hym. B.M., i, p. 17, 1853, ♀.
Hab. : Australia.
- Euryglossa cygnella** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 473, 1905, ♂.
Hab. : Swan River, W.A.
- Euryglossa depressa** Sm., Cat. Hym. B.M., i, p. 18, 1853, ♀.
Hab. : Australia.
- Euryglossa depressa sparsa** Ckll., Proc. Acad. Nat. Sc. Philad., p. 363, 1916, ♀.
Hab. : Mount Yule, Healesville, V.
- *Euryglossa edwardsii** Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 230, 1907, ♀; Mem. Queensl. Mus., v., p. 199, 1916.
Hab. : New South Wales ; Brisbane, Q.

- Euryglossa ephippiata** Sm., Trans. Ent. Soc. Lond. (3), i. p. 58, 1862-64, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 292, 1905, ♀.
Hab. : Adelaide, S.A. ; Mackay, Q.
- Euryglossa euxantha** Perk., Ann. Mag. Nat. His. (8), ix, p. 111, 1912, ♀.
Hab. : Port Darwin, N.T.
- Euryglossa fasciatella** Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 230, 1907, ♀; Ann. Mag. Nat. His. (8), xii, p. 512, 1913, ♂.
Hab. : South Australia ; Cheltenham, V.
- Euryglossa flavocuneata** Ckll., Ann. Mag. Nat. His. (8), xv, p. 349, 1915, ♀.
Hab. : Yallingup, W.A.
- *Euryglossa flavopicta** Sm., New Sp. Hym. B.M., p. 14, 1879, ♀; Ckll., Mem. Queensl. Mus., 5, p. 199, 1916, ♀.
Hab. : Champion Bay, W.A. ; Brisbane, Q.
- Euryglossa frenchii** Ckll., Ann. Mag. Nat. His. (8), vi, p. 167, 1910.
Hab. : Victoria.
- Euryglossa froggattiana** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 472, 1905, ♀.
Hab. : Shoalhaven, N.S.W.
- Euryglossa furcifera** Ckll., Ann. Mag. Nat. His. (8), xi, p. 387, 1913, ♂ ♀.
Hab. : Purnong, S.A.
- Euryglossa geminata** Ckll., Ann. Mag. Nat. His. (8), viii, p. 289, 1911, ♀.
Hab. : Cheltenham, V.
- *Euryglossa hæmatura** Ckll., Ann. Mag. Nat. His. (8), viii, p. 289, 1911, ♀; Ann. Mag. Nat. His. (8), xi, p. 281, 1913, ♀.
Hab. : Walcha, N.S.W. ; Brisbane, Q.
- Euryglossa halictiformis** Sm., New Sp. Hym. B.M., p. 15, 1879, ♀.
Hab. : Swan River, W.A.
- Euryglossa halictina** Ckll., Ann. Mag. Nat. His. (9), v, p. 117, 1920, ♀.
Hab. : Bridport, T.
- Euryglossa hemichlora** Ckll., The Entomologist, p. 214, 1914, ♂ ♀.
Hab. : Yallingup, W.A.
- *Euryglossa hemixantha** Ckll., Insecutor Insectiæ Menstruus, ii, p. 99, 1914, ♂.
Hab. : Brisbane, Q.
- *Euryglossa hypoleuca** Ckll., Mem. Queensl. Mus., vi, p. 115, 1918, ♂.
Hab. : Brisbane, Caloundra, Q.
- Euryglossa inconspicua** Ckll., Ann. Mag. Nat. His. (8), xii, p. 512, 1913, ♀.
Hab. : Purnong, V.

- Euryglossa jucunda** Sm., New Sp. Hym. B.M., p. 13, 1879, ♀; Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 209, 1910, ♀.
Hab.: Champion Bay, Swan River, W.A.; Mackay, Q.
- Euryglossa latissima** Ckll., The Entomologist, p. 215, 1914, ♀; Ann. Mag. Nat. His. (8), xv, p. 530, 1915, ♂.
Hab.: Eaglehawk Neck, T.
- Euryglossa leptospermi** Ckll., Ann. Mag. Nat. His. (8), vi, p. 167, 1910, ♀.
Hab.: Mackay, Q.
- Euryglossa maculata** Sm., New Sp. Hym. B.M., p. 13, 1879, ♀.
Hab.: Swan River, W.A.
- Euryglossa melanosoma** Ckll., The Entomologist, p. 214, 1914, ♀.
Hab.: Yallingup, W.A.
- Euryglossa mutica** Ckll., Ann. Mag. Nat. His. (8), ix, p. 143, 1912, ♂.
Hab.: Sydney, N.S.W.
- Euryglossa myrtacearum** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 209, 1910, ♀.
Hab.: Mackay, Q.
- Euryglossa narifera** Ckll., Ann. Mag. Nat. His. (8), xv, p. 348, 1915, ♀.
Hab.: Yallingup, W.A.
- *Euryglossa neglectula** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 474, ♀; Mem. Queensl. Mus., v, p. 199, 1916.
Var. A Ckll., Ann. Mag. Nat. His. (8), xi, p. 281, 1913.
Hab.: Brisbane, Q.
- Euryglossa neglectula mica** Ckll., Mem. Queensl. Mus., vi, p. 116, 1918, ♂.
Hab.: Brisbane, Q.
- Euryglossa nigra** Sm., New Sp. Hym. B.M., p. 13, 1879, ♀.
Hab.: Australia.
- Euryglossa nigrocærulea** Ckll., Proc. Acad. Nat. Sc. Philad., p. 33, 1913, ♀.
Hab.: Croydon, V.; Mount Wellington, T.
- Euryglossa nitidifrons** Sm., New Sp. Hym. B.M., p. 14, 1879, ♀.
Hab.: Australia.
- Euryglossa nubilipennis** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 56, 1914, ♀.
Hab.: Mount Wellington, T.
- Euryglossa paupercula** Ckll., Ann. Mag. Nat. His. (8), xv, p. 348, 1915, ♀.
Hab.: Yallingup, W.A.
- Euryglossa pavonura** Ckll., Trans. Amer. Ent. Soc., xxxv, p. 211, 1910, ♀.
Hab.: Cooktown, Q.

Euryglossa perditiformis Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 207, 1910, ♀.

Hab. : Mackay, Q.

Euryglossa pernana Ckll., Ann. Mag. Nat. His. (7), xvi, p. 474, 1905, ♀.

Hab. : Freemantle, W.A.

Euryglossa perpulchra Ckll., Ann. Mag. Nat. His. (8), xvii, p. 434, 1916, ♂.

Hab. : Kalamunda, W.A.

Euryglossa perpusilla Ckll., The Entomologist, p. 263, 1910, ♀.

Hab. : Mackay, Q.

Euryglossa platyrhina Ckll., Ann. Mag. Nat. His. (8), xv, p. 350, 1915, ♀.

Hab. : Yallingup, W.A.

Euryglossa quadrimaculata Sm., New Sp. Hym. B.M., p. 12, 1879, ♀.

Hab. : Queensland.

***Euryglossa reginae** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 475, 1905, ♂.

Hab. : Mackay, Brisbane, Q.

Euryglossa rejecta Ckll., Ann. Mag. Nat. His. (7), xvi, p. 476, 1905, ♂.

Hab. : Perth, W.A.

Euryglossa rhodochlora Ckll., Ann. Mag. Nat. His. (8), xiv, p. 470, 1914, ♀.

Hab. : Yarrawin, N.S.W.

Euryglossa ridens Ckll., Ann. Mag. Nat. His. (8), xi, p. 388, 1913, ♀.

Hab. : Blue Mountains, N.S.W.

Euryglossa ruberrima Ckll., Proc. Acad. Nat. Sc. Philad., p. 36, 1913, ♀; Ann. Mag. Nat. His. (8), xvii, p. 434, 1916, ♀.

Hab. : Healesville, V.

Euryglossa rubiginosa Dalla Torre.

Euryglossa rubricata Sm., New Sp. Hym. B.M., p. 14, 1879, ♀ (*non* p. 12, No. 3).

Euryglossa rubiginosa D.T., Cat. Hym., x, p. 50, 1896.

Hab. : Swan River, W.A.

Euryglossa rubricata Sm., New Sp. Hym. B.M., p. 12, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 293, 1905; Ckll., Ann. Mag. Nat. His. (8), vi, p. 167, 1910.

Hab. : Swan River, W.A.; Mackay, Q.

Euryglossa salaris Ckll., Trans. Ent. Soc. Amer., xxxvi, p. 210, 1910, ♀.

Hab. : Mackay, Q.

Euryglossa sanguinosa Ckll., Proc. Acad. Nat. Sc. Philad., p. 35, 1913.

Hab. : Windsor, V.

- Euryglossa schomburgki** Ckll., Journ. New York Ent. Soc., xviii, p. 99, 1910, ♀.
Hab. : Adelaide, S.A.
- ***Euryglossa semicastanea** Ckll., Mem. Queensl. Mus., vi, p. 115, 1918, ♀.
Hab. : Brisbane, Q.
- Euryglossa semirufa** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 469, 1914, ♀.
Hab. : Yarrawin, N.S.W.
- Euryglossa simillima** Sm., New Sp. Hym. B.M., p. 12, 1879, ♀.
Hab. : Swan River, W.A.
- Euryglossa sinapina** Ckll., Proc. Acad. Nat. Sc. Philad., p. 35, 1913, ♂.
Hab. : Purnong, S.A.
- Euryglossa sinapipes** Ckll., Jour. New York Ent. Soc., xviii, p. 99, 1910, ♂.
Hab. : Adelaide, S.A.
- Euryglossa subfusa** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 210, 1910, ♀.
Hab. : Port Darwin, N. T.
- ***Euryglossa subsericea** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 293, ♀; Ann. Mag. Nat. His. (8), vi, p. 168, 1910, ♀.
Hab. : Mackay, Brisbane.
- Euryglossa tasmanica** Ckll., Ann. Mag. Nat. His. (9), i, p. 164, 1918, ♀.
Hab. : Launceston, T.
- Euryglossa tenuicornis** Ckll., Proc. Acad. Nat. Sc. Philad., p. 34, 1913, ♂.
Hab. : Purnong, S.A.
- Euryglossa terminata** Sm., Cat. Hym. B.M., i, p. 18, 1853, ♀.
Hab. : Australia.
- Euryglossa tricolor** Sm., New Sp. Hym. B.M., p. 15, 1879, ♀.
Hab. : Swan River, W.A.
- Euryglossa tridentifrons** Ckll., Ann. Mag. Nat. His. (8), xii, p. 510, 1913, ♂.
Hab. : Nagambie, V.
- Euryglossa undulata** Ckll., The Entomologist, p. 198, 1914, ♀ ♂.
Hab. : Yallingup, W.A.
- Euryglossa variabilis** Perk., Ann. Mag. Nat. His. (8), ix, p. 110, 1912, ♂.
Hab. : Bundaberg, Q.
- Euryglossa victoriæ** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 207, 1910, ♀.
Hab. : Victoria.
- Euryglossa villosula** Sm., New Sp. Hym. B.M., p. 15, 1879, ♂.
Hab. : Swan River, W.A.

Euryglossa walkeriana Ckll., Ann. Mag. Nat. His. (7), xvi, p. 473, 1905, ♀.

Hab. : Launceston, T.

Genus EURYGLOSSELLA Ckll., The Entomologist, xliii, p. 263, 1910.

***Euryglossella atomaria** Ckll., Insecutor Inscitiæ Menstruus, ii, p. 100, 1914, ♀.

Hab. : Brisbane, Q.

***Euryglossella globuliceps** Ckll., Mem. Queensl. Mus., vi, p. 116, 1918, ♀.

Hab. : Brisbane, Q.

Euryglossella minima Ckll., The Entomologist, xliii, p. 263, 1910, ♀.

Hab. : Mackay, Q.

Genus EURYGLOSSIDIA Ckll., Ann. Mag. Nat. His. (8), vi, p. 358, 1910.

Euryglossidia ichneumonoides (Ckll.).

Euryglossa ichneumonoides Ckll., The Entomologist, p. 17, 1906.

Euryglossidia ichneumonoides Ckll., Ann. Mag. Nat. His. (8), vi, p. 359, 1910.

Hab. : Western Australia.

Euryglossidia purpurascens Ckll., The Entomologist, p. 197, 1914, ♂.

Hab. : Yallingup, W.A.

Euryglossidia rectangulata Ckll., Ann. Mag. Nat. His. (8), vi, p. 359, 1910, ♀.

Genotype.

Hab. : Victoria.

Genus EURYGLOSSINA Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 211, 1911.

(Described as a subgenus.)

***Euryglossina chalcosoma** Ckll., Ann. Mag. Nat. His. (8), xi, p. 391, 1913, ♀♂ ;

Insecutor Inscitiæ Menstruus, ii, p. 100, 1914.

Hab. : Croydon, V. ; Brisbane, Q.

Euryglossina cockerelli Perk., Ann. Mag. Nat. His. (8), ix, p. 113, 1912, ♀.

Hab. : Bundaberg, Q.

Euryglossina flaviventris Ckll., Proc. Acad. Nat. Sc. Philad., p. 362, 1916, ♀♂.

Hab. : Mount Yule, Healesville, V.

Euryglossina fultoni Ckll., Ann. Mag. Nat. His. (8), xi, p. 390, 1913, ♀♂.

Hab. : Purnong, S.A.

Euryglossina hypochroma Ckll., Proc. Acad. Nat. Sc. Philad., p. 362, 1916, ♀.

Hab. : Perth, W.A.

Euryglossina microxantha Ckll., Ann. Mag. Nat. His. (8), xiv, p. 7, 1914, ♀.

Hab. : Mackay, Q.

***Euryglossina perpusilla** Ckll., The Entomologist, xliii, p. 263, 1910, ♀ ; Insecutor Inscitiæ Menstruus, ii, p. 100, 1914, ♂.

Hab. : Brisbane, Q.

Euryglossina perpusilla var. nana Ckll., Proc. Acad. Nat. Sc. Philad., p. 363, 1916, ♀.
Hab. : Kalamunda, W. A.

Euryglossina proctotrypoides Ckll., Ann. Mag. Nat. His. (8), xi, p. 392, 1913, ♀.
Hab. : Croydon, V.

Euryglossina semipurpurea Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 211, 1910.
Genotype.

Euryglossa semipurpurea Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 208, 1910, ♀.
Hab. : Mackay, Q.

Euryglossina sulphurella Ckll., Ann. Mag. Nat. His. (8), xi, p. 389, 1913, ♀ ♂.
Hab. : Purnong, S.A.

Euryglossina sulphurella var. perlutea Ckll., Ann. Mag. Nat. His. (8), xvii, p. 434, 1916.
Hab. : Kalamunda, W.A.

Euryglossina xanthodonta Ckll., Ann. Mag. Nat. His. (8), xi, p. 391, 1913, ♂.
Hab. : Purnong, S.A.

Genus GNATHOPROSOPIS Perk., Ann. Mag. Nat. His. (8), ix, p. 104, 1912.

***Gnathoprosopis amicula** (Sm.).

Prosopis amicula Sm., New Sp. Hym. B.M., p. 19, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 467, 1905, ♀; Ckll., Ann. Mag. Nat. His. (8), ix, p. 146, 1912.

Gnathoprosopis amicula Ckll., Mem. Queensl. Mus., v, p. 198, 1916, ♂.
Hab. : Champion Bay, W.A.; Melbourne, V.; Sydney, N.S.W.; Brisbane, Mackay, Q.

Gnathoprosopis asinella (Ckll.).

Prosopis asinella Ckll., Proc. Acad. Nat. Sc. Philad., p. 37, 1913, ♂.

Gnathoprosopis asinella Ckll., Mem. Queensl. Mus., v, p. 198, 1916.

Hab. : Purnong, S.A.

Gnathoprosopis bituberculata (Sm.).

Prosopis bituberculata Sm., New Sp. Hym. B.M., p. 18, 1879, ♂.

Hab. : Melbourne; V.

***Gnathoprosopis euxantha** (Ckll.).

Prosopis xanthopoda Ckll., Ann. Mag. Nat. His. (8), vi, p. 28, 1910. (Not of Vachal, 1895.)

Prosopis euxantha Ckll., Ann. Mag. Nat. His. (8), vi, p. 166, 1910.

Gnathoprosopis euxantha Ckll., Mem. Queensl. Mus., v, p. 198, 1916.

Hab. : Victoria; Brisbane, National Park, Q.

***Gnathoprosopis hackeri** Ckll., Ann. Mag. Nat. His. (8), x, p. 489, 1912. ♂; Mem. Queensl. Mus., v, p. 198, 1916, ♀.

Hab. : Brisbane, Caloundra, Bribie Island, Q.

Gnathoprosopis rowlandi Ckll., Ann. Mag. Nat. His. (8), xiv, p. 55, 1914, ♂.

Hab. : Yallingup, W.A.

***Gnathoprosopis theodori** Perk., Ann. Mag. Nat. His. (8), ix, p. 105, 1912, ♂.

Hab. : Townsville, Brisbane, Q.

Genus **HETERAPIS** Ckll., The Entomologist, xlv, p. 140, 1911.

Heterapis delicata Ckll., The Entomologist, xlv, p. 140, 1911, ♀.

Hab. : Mackay, Q.

Heterapis halictiformis Perk., Ann. Mag. Nat. His. (8), ix, p. 112, 1912, ♂.

Hab. : Bundaberg, Q.

Heterapis sculpta Ckll., The Entomologist, xlv, p. 141, 1911, ♀.

Hab. : Mackay, Q.

Genus **HYLEOIDES** Sm., MSS. Cat. Hym. B.M., i, p. 32, 1853 : Perk., Ann. Mag. Nat. His. (8), ix, p. 108, 1912.

***Hyleoides bivulnerata** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 81, 1921, ♀.

Hab. : Brisbane, Q. ; Bamawm, V.

***Hyleoides concinna** (Fabr.).

Vespa concinna Fabr., Syst. Ent., p. 367, 1775.

Hyleoides concinna Sm., Cat. Hym. B.M., i, 32, 1853, ♀.

Hyleoides concinna Ckll., Ann. Mag. Nat. His. (8), iv, p. 310, 1909, ♀ ♂.

Hab. : Bright, V. ; Sydney, N.S.W. ; Brisbane, Stradbroke Island, Q.

Hyleoides concinnula Ckll., Ann. Mag. Nat. His. (8), iv, p. 310, 1909, ♀ ♂ : Jour. Ent. Soc. New York, xviii, p. 101, 1910.

Hab. : Adelaide, S.A. ; Swan River, W.A.

***Hyleoides striatula** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 81, 1921, ♀.

Hab. : Kuranda, Q.

Hyleoides waterhousei Ckll., Ann. Mag. Nat. His. (8), xi, p. 387, 1913, ♀.

Hab. : South Australia.

***Hyleoides zonalis** Sm., Cat. Hym. B.M., i, p. 32, 1853, ♀ ; Ckll., Ann. Mag. Nat. His. (8), iv, p. 310, 1909, ♀.

Hab. : Hunter River, N.S.W. ; Swan River, Mundaring, W.A.

Hyleoides zonalis albocincta Ckll., Ann. Mag. Nat. His. (8), iv, p. 309, 1909, ♀.

Hab. : Western Australia.

Hyleoides zonalis rufocincta Ckll., Ann. Mag. Nat. His. (8), iv, p. 310, 1909, ♀♂.

Hab. : Swan River, W.A.

Genus **MELITTOSMITHIA** Schulz.

Smithia Vachel., Bull. Soc. Ent. Fr., p. 61, 1897 (Præoc.).

Melittosmithia Schulz, Spolia. Hym., p. 244, 1906 (*nom. nov.* for *Smithia*).

Melittosmithia Ckll., Ann. Mag. Nat. His. (8), vi, p. 358, 1910.

Melittosmithia australiensis (Dalla Torre).

Macropis australiensis D.T., Cat. Hym., x, p. 193, 1896.

Scapter bicolor Sm., Trans. Ent. Soc. Lond. (3), i, p. 61, 1862-64 (*nec* Lepeletier).

Melittosmithia australiensis Ckll., Ann. Mag. Nat. His. (8), vi, p. 358, 1910.

Hab. : Australia.

Melittosmithia carinata (Sm.). Genotype.

Scapter carinata Sm., Trans. Ent. Soc. Lond. (3), i, p. 60, 1862-64.

Melittosmithia carinata Ckll., Ann. Mag. Nat. His. (8), vi, p. 358, 1910.

Hab. : Australia.

Genus **MEROGLOSSA** Sm.. MSS. Cat. Hym. B.M., p. 33, 1853 : Perk., Ann. Mag. Nat. His. (8), ix, p. 96, 1912.

Meroglossa baudinensis (Ckll.).

Prosopis baudinensis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 471, 1905, ♀.

Meroglossa baudinensis Ckll., Ann. Mag. Nat. His. (8), vi, p. 22, 1910.

Hab. : Baudin Island, N.W.A. ; Port Darwin, N.T.

Meroglossa canaliculata Sm., Cat. Hym. B.M., i, p. 33, 1853, ♂.

Hab. : Port Essington, N.T.

Meroglossa deceptor Perk., Ann. Mag. Nat. His. (8), ix, p. 101, 1912, ♂.

Hab. : Cairns, Herberton, Q.

Meroglossa decipiens Perk., Ann. Mag. Nat. His. (8), ix, p. 101, 1912, ♂♀.

Hab. : Herberton, Q. ; Port Darwin, N.T.

***Meroglossa desponsa** (Sm.).

Prosopis desponsa Sm., Cat. Hym. B.M., i, p. 31, 1853, ♀.

Prosopis desponsa Ckll., Ann. Mag. Nat. His. (8), ix, p. 146, 1912, ♀.

Meroglossa desponsa Perk., Ann. Mag. Nat. His. (8), ix, p. 98, 1912.

Hab. : Heathcote, N.S.W. ; Brisbane, Q.

Meroglossa desponsa var. kershawi Ckll., Proc. Acad. Nat. Sc. Philad., p. 32, 1913, ♀.

Hab. : Victoria.

***Meroglossa diversipuncta** (Ckll.).*Prosopis diversipuncta* Ckll., Ann. Mag. Nat. His. (8), iv, p. 395, ♀.*Meroglossa diversipuncta* Ckll., Ann. Mag. Nat. His. (8), ix, p. 98, 1912.

Hab. : Kuranda, Q.

Meroglossa eucalypti Ckll., Ann. Mag. Nat. His. (8), vi, p. 18, 1910, ♂ ♀.

Hab. : Mackay, Q.

Meroglossa impressifrons (Sm.).*Prosopis impressifrons* Sm., Cat. Hym. B.M., i, p. 31, 1853, ♂.*Prosopis impressifrons* Ckll., Ann. Mag. Nat. His. (8), ix, p. 145, 1912, ♂.*Meroglossa impressifrons* Perk., Ann. Mag. Nat. His. (8), ix, p. 98, 1912.

Hab. : Kenthurst, N.S.W. ; Brisbane, Q.

Meroglossa lactifera Ckll., Ann. Mag. Nat. His. (8), vi, p. 19, 1910, ♂ ♀.

Hab. : Mackay, Cairns, Q.

***Meroglossa nigrifrons** (Sm.).*Prosopis nigrifrons* Sm. Cat. Hym. B.M., i, p. 30, 1853, ♀.*Meroglossa nigrifrons* Perk., Ann. Mag. Nat. His. (8), ix, p. 98, 1912.

Hab. : Brisbane, Caloundra, Bribie Island, Q.

Meroglossa nigrifrons var. A, Ckll., Ann. Mag. Nat. His. (8), vi, p. 163, 1910, ♀.

Hab. : Victoria.

***Meroglossa penetrata** (Sm.).*Prosopis penetrata* Sm., New Sp. Hym. B.M., p. 25, 1879, ♀.*Meroglossa penetrata* Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Brisbane, Stradbroke Island, Townsville, Q.

***Meroglossa penetrata percrassa** (Ckll.).*Prosopis percrassa* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 469, 1905, ♀.*Meroglossa penetrata percrassa* Ckll., Ann. Mag. Nat. His. (8), vi, p. 21, 1910.

Hab. : Mackay, Cairns, Q.

***Meroglossa persulcata** Ckll.*Meroglossa (sulcifrons* subsp. ?) *persulcata* Ckll., Ann. Mag. Nat. His. (8), ix, p. 144, 1912, ♀.*Meroglossa persulcata* Ckll., Ann. Mag. Nat. His. (8), x, p. 488, 1912.

Hab. : Brisbane, Caloundra, Q.

Meroglossa rubricata (Sm.).*Prosopis rubricata* Sm., New Sp. Hym. B.M., p. 25, 1879, ♀.*Meroglossa rubricata* Perk., Ann. Mag. Nat. His. (8), ix, p. 98, 1912.

Hab. : Swan River, W.A.

Meroglossa sculptissima Ckll., Ann. Mag. Nat. His. (8), vi, p. 19, 1910, ♂ ♀.

Hab. : Mackay, Q.

Meroglossa soror Perk., Ann. Mag. Nat. His. (8), ix, p. 100, 1912, ♀.

Hab. : Herberton District, Q.

Meroglossa sulcifrons (Sm.).*Prosopis sulcifrons* Sm., Cat. Hym. B.M., i, p. 27, 1853.*Meroglossa sulcifrons* Ckll., Ann. Mag. Nat. His. (8), ix, p. 144, 1912.

Hab. : Australia.

Meroglossa torrida (Sm.).*Prosopis torrida* Sm., New Sp. Hym. B.M., p. 25, 1879, ♀.*Meroglossa torrida* Perk., Ann. Mag. Nat. His. (8), ix, p. 98, 1912.

Hab. : Queensland.

Genus *NEOPASIPHÆ* Perk., Ann. Mag. Nat. His. (8), ix, p. 114, 1912.**Neopasiphæ mirabilis** Perk., Ann. Mag. Nat. His. (8), ix, p. 115, 1912, ♂.

Hab. : Western Australia.

Genus *PACHYPROSOPIS* Perk., Proc. Hawaiian Ent. Soc., ii, p. 29, 1908.***Pachyprosopis angophoræ** Ckll., Ann. Mag. Nat. His. (8), ix, p. 141, 1912, ♂.

Hab. : Sydney, N.S.W. : Brisbane, Q.

Pachyprosopis atromicans Ckll., Proc. Acad. Nat. Sc. Philad., p. 37, 1913, ♂ ♀.

Hab. : Murray River, S.A. ; Croydon, V.

Pachyprosopis barbata Ckll., Insecutor Inscitiæ Menstruus, ii, p. 101, 1914, ♂.

Hab. : Brisbane, Q.

Pachyprosopis doddi Ckll., Ann. Mag. Nat. His. (8), vi, p. 167, 1910, ♀.

Hab. : Townsville, Q.

***Pachyprosopis flavicauda** Ckll., Ann. Mag. Nat. His. (8), ix, p. 141, 1912, ♀.

Hab. : Sydney, N.S.W. ; Mount Wellington, T.

***Pachyprosopis hackeri** Ckll., Mem. Queensl. Mus., v, p. 199, 1916, ♀.

Hab. : Brisbane, Q.

***Pachyprosopis hæmatostoma** Ckll., Proc. Acad. Nat. Sc. Philad., p. 36, 1913, ♀ :

Ckll., Ann. Mag. Nat. His. (8), xv, p. 347, 1915.

Pachyprosopis aurantipes Ckll., Ann. Mag. Nat. His. (8), xii, p. 513, 1913, ♂.*Vide* Meade-Waldo's determination.

Hab. : Windsor, Croydon, V. ; Kalamunda, W.A.

Pachyprosopis holoxanthopus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 469, 1914, ♂.

Hab. : Yarrawin, N.S.W.

Pachyprosopis humeralis Ckll., Ann. Mag. Nat. His. (8), ix, p. 142, 1912, ♂.

Hab. : Sydney, N.S.W.

***Pachyprosopis indicans** Ckll., Mem. Queensl. Mus., vi, p. 116, 1918, ♂.

Hab. : Brisbane, Q.

Pachyprosopis kellyi Ckll., Ann. Mag. Nat. His. (8). xvii. p. 432, 1916, ♀.

Hab. : Mount Yule, Healesville, V.

***Pachyprosopis mirabilis** Perk., Proc. Hawaiian Ent. Soc., p. 30, 1908 ; Ckll., Ann. Mag. Nat. His. (8), vi, p. 166, 1910, ♀.

Hab. : Mackay, Caloundra, Brisbane, Q.

Pachyprosopis nitidiceps Ckll., Ann. Mag. Nat. His. (8), ix. p. 384, 1912, ♀.

Hab. : Mackay, Q.

Pachyprosopis obesa Ckll., Ann. Mag. Nat. His. (8), ix, p. 383, 1912, ♀.

Hab. : Sydney, N.S.W.

Pachyprosopis plebeia Ckll., Ann. Mag. Nat. His. (8). vi, p. 166, 1910, ♀.

Hab. : Mackay, Q.

Pachyprosopis saturnina Ckll., Ann. Mag. Nat. His. (8). xi. p. 393, 1913, ♀ ; Proc. Acad. Nat. Sc. Philad., p. 362, 1916.

Hab. : Purnong, S.A. ; Perth, W.A.

Pachyprosopis semisericea (Ckll.).

Stilpnosoma semisericea Ckll., Ann. Mag. Nat. His. (7), xvi, p. 476, 1905, ♀.

Pachyprosopis semisericea Ckll., Ann. Mag. Nat. His. (8), vi, p. 167, 1910.

Hab. : Mackay, Q.

Genus **PALÆORHIZA** Perk., Proc. Hawaiian Ent. Soc., ii, p. 29, 1908 ; Ann. Mag. Nat. His. (8), ix, p. 102, 1912.

Palæorhiza basilura Ckll., Ann. Mag. Nat. His. (8), v, p. 500, 1910, ♀.

Hab. : Cairns, Kuranda, Q.

Palæorhiza denticauda (Ckll.).

Meroglossa denticauda Ckll., Ann. Mag. Nat. His. (8), vi, p. 24, 1910, ♂ ♀.

Palæorhiza denticauda Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Mackay, Q.

Palæorhiza flavomellea Ckll., Ann. Mag. Nat. His. (8), v, p. 500, 1910, ♀ ♂.

Hab. : Kuranda, Cairns, Q.

***Palæorhiza luxuriosa** (Ckll.).

Meroglossa luxuriosa Ckll., Ann. Mag. Nat. His. (8), vi, p. 22, 1910, ♂ ♀.

Palæorhiza luxuriosa Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Cairns, Kuranda, Q.

Palæorhiza melanura Ckll., Ann. Mag. Nat. His. (8), v, p. 499, ♂ ♀.

Hab. : Cairns, Kuranda, Q.

**Palæorhiza melliceps* Ckll., Mem. Queensl. Mus., vi, p. 115, 1918, ♀.

Hab. : Brisbane, Tambourine Mountain, Q.

**Palæorhiza parallela* (Ckll.).

Prosopis parallela Ckll., Ann. Mag. Nat. His. (7), xvi, p. 400, 1905, ♀.

Palæorhiza parallela Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Mackay, Kuranda, Caloundra, Gordonvale, Q.

**Palæorhiza parallela disrupta* Ckll., Insecutor Inscitiæ Menstruus, ii, p. 98, 1914, ♀.

Hab. : Kuranda, Port Douglas, Dunk Island, Q.

Palæorhiza parallela var. *recessiva* Ckll., Ann. Mag. Nat. His. (8), ix, p. 149, 1912, ♂.

Hab. : Mackay, Q.

Palæorhiza perkinsi (Ckll.).

Meroglossa perkinsi Ckll., Ann. Mag. Nat. His. (8), vi, p. 23, 1910, ♂.

Palæorhiza perkinsi Perk., Ann. Mag. Nat. His. (8), ix, p. 93, 1912.

Palæorhiza perkinsi Ckll., Jour. New York Ent. Soc., xviii, p. 98, 1910.

Hab. : Cooktown, Q.

**Palæorhiza perviridis* (Ckll.). Genotype.

Prosopis perviridis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 401, 1905, ♀.

Palæorhiza perviridis Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Adelaide River, N.T. ; Kuranda, Brisbane, Q.

Palæorhiza perviridis cassiæfloris (Ckll.).

Meroglossa perviridis cassiæfloris Ckll., Ann. Mag. Nat. His. (8), vi, p. 22, 1910, ♀.

Hab. : Mackay, Q.

**Palæorhiza reginarum* (Ckll.).

Prosopis reginarum Ckll., Ann. Mag. Nat. His. (7), xvi, p. 402, 1905, ♀.

Meroglossa reginarum Ckll., Ann. Mag. Nat. His. (8), vi, p. 22, 1910, ♂.

Palæorhiza reginarum Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Mackay, Brisbane, Stradbroke Island, Q.

**Palæorhiza turneriana* (Ckll.).

Prosopis turneriana Ckll., Ann. Mag. Nat. His. (7), xvi, p. 402, 1905, ♂ ♀.

Palæorhiza turneriana Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Mackay, Kuranda, Q.

Palæorhiza turneriana kurandensis (Ckll.).

Prosopis turneriana kurandensis Ckll., Ann. Mag. Nat. His. (8), iv, p. 394, 1909, ♂.

Meroglossa turneriana kurandensis Ckll., Ann. Mag. Nat. His. (8), vi, p. 21, 1910, ♂.

Hab. : Kuranda, Cooktown, Q.

Palæorhiza turneriana viridimutans (Ckll.).

Meroglossa turneriana viridimutans Ckll., Ann. Mag. Nat. His. (8), vi, p. 21, 1910, ♀.

Hab. : Port Darwin, N.T.

Palæorhiza varicolor (Sm.).

Prosopis varicolor Sm., New Sp. Hym. B.M., p. 24, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 399, 1905, ♂ ♀.

Palæorhiza varicolor Perk., Ann. Mag. Nat. His. (8), ix, p. 99, 1912.

Hab. : Townsville, Bowen, Q.

Palæorhiza varicolor eboracina (Ckll.).

Meroglossa varicolor eboracina Ckll., Ann. Mag. Nat. His. (8), vi, p. 23, 1910, ♂.

Palæorhiza varicolor eboracina Perk., Ann. Mag. Nat. His. (8), ix, p. 103, 1912;

Perk., Ann. Mag. Nat. His. (8), ix, p. 103, 1912, ♂ ♀.

Hab. : Cape York, Cairns, Kuranda, Q.

Palæorhiza viridifrons Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 86, 1921, ♀.

Hab. : Brisbane, Q.

Genus *PROSOPIS* Fabr., Piez. Syst., p. 293, 1804; Perkins, Ann. Mag. Nat. His. (8), ix, p. 103, 1912.

Prosopistemon Ckll., The Entomologist, xxix, p. 17, 1906.

Prosopistemon merged into *Prosopis* Ckll., Nature, p. 311, 1910.

Prosopis accipitris Ckll., Ann. Mag. Nat. His. (8), xiv, p. 53, 1914, ♂ ♀.

Hab. : Eaglehawk Neck, T.

Prosopis albomaculata Sm., New Sp. Hym. B.M., p. 24, 1879, ♀.

Hab. : Champion Bay, W.A.

***Prosopis albonitens** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 399, 1905, ♂; Ann. Mag. Nat. His. (7), xvi, p. 467, 1905, ♀.

Hab. : Mackay, Bribie Island, Stradbroke Island, Q.

***Prosopis alcyonea** Erichs., Wieg. Arch., p. 267, 1842, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 399, 1905, ♂ ♀; Ann. Mag. Nat. His. (8), vi, p. 30, 1910.

Prosopis vidua Sm., Cat. Hym. B.M., i, p. 29, 1853, ♂.

Hab. : Albany, W.A.; Sydney, N.S.W.

Prosopis amata Ckll., Ann. Mag. Nat. His. (8), iv, p. 394, 1909; Ann. Mag. Nat. His. (8), vi, p. 29, 1910.

Hab. : Kuranda, Mackay, Q.

***Prosopis amiculiformis** Ckll., Ann. Mag. Nat. His. (8), iv, p. 394, 1909, ♀; Ann. M. Nat. His. (8), vi, p. 30, 1910, ♂; Mem. Queensl. Mus., vi, p. 113, 1918

Hab. : Mackay, Brisbane, Q.

Prosopis ancorata Ckll., Ann. Mag. Nat. His. (8), ix, p. 148, 1912, ♂.

Hab. : Sydney, N.S.W.

- ***Prosopis aposuara** Ckll., Ann. Mag. Nat. His. (8), vi, p. 164, 1910, ♂.
Hab. : Gilgai, N.S.W. ; Mackay, Stradbroke Island, Brisbane, Q.
- Prosopis aralis** Ckll., Proc. Acad. Nat. Sc. Philad., p. 364, 1916, ♀.
Hab. : Mount Yule, Healesville, V.
- ***Prosopis aureomaculata** Ckll., Ann. Mag. Nat. His. (8), iv, p. 395, 1909, ♂.
Hab. : Sydney, Como, N.S.W. ; Brisbane, National Park, Caloundra, Q.
- ***Prosopis aurifera** Ckll., Mem. Queensl. Mus., vi, p. 113, 1918, ♀.
Hab. : Stradbroke Island, Q.
- ***Prosopis bacillaria** Ckll., Insecutor Inscitiæ Menstruus, ii, p. 98, 1914, ♂.
Hab. : Brisbane, Bribie Island, Caloundra, Q.
- Prosopis bicolorata** Sm., Cat. Hym. B.M., i, p. 27, 1853, ♀.
Hab. : Adelaide, S.A.
- ***Prosopis bidentata** Sm., Cat. Hym. B.M., i, p. 28, 1853, ♂ ; Ckll., Mem. Queensl. Mus., vi, p. 114, 1918.
Hab. : Stradbroke Island, Q.
- Prosopis brevior** Ckll.
Prosopis perhumilis Ckll., Mem. Queensl. Mus., v, p. 197, 1916.
Prosopis brevior Ckll., Ann. Mag. Nat. His. (9), i, p. 164, 1918.
Hab. : Oxley, Brisbane, Q.
- Prosopis callosa** Ckll., Jour. New York Ent. Soc., xviii, p. 104, 1910, ♂.
Hab. : Port Phillip, V.
- Prosopis cassiæ** Ckll., Ann. Mag. Nat. His. (8), vi, p. 29, 1910, ♀.
Hab. : Mackay, Q.
- ***Prosopis cenibera** Ckll., Ann. Mag. Nat. His. (8), vi, p. 165, 1910 ; Insecutor Inscitiæ Menstruus, ii, p. 97, 1914.
Hab. : Mackay, Caloundra, Brisbane, Q.
- ***Prosopis certa** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 85, 1921, ♂ ♀.
Hab. : Brisbane, Q.
- Prosopis chlorosoma** Ckll., Proc. Acad. Nat. Sc. Philad., p. 40, 1913, ♀ ; Ann. Mag. Nat. His. (9), i, p. 163, 1918.
Hab. : Croydon, V. ; Launceston, T.
- ***Prosopis chromatica** Ckll., Ann. Mag. Nat. His. (8), ix, p. 382, 1912, ♂ ; Mem. Queensl. Mus., vi, p. 113, 1918.
Hab. : Mackay, Brisbane, Bribie Island, Q.
- Prosopis chrysaspis** Ckll., Jour. Ent. Soc. New York, xviii, p. 102, 1910, ♀.
Hab. : Victoria ; Adelaide, S.A.
- Prosopis chrysaspis var. A**, Ckll., Ann. Mag. Nat. His. (8), vi, p. 25, 1910, ♀.
Hab. : Victoria.

- *Prosopis chrysognatha** Ckll., Jour. New York Ent. Soc., xviii, p. 102, 1910, ♂ ♀;
Ann. Mag. Nat. His. (8), vi, p. 165, 1910, ♀; Ann. Mag. Nat. His. (8), ix,
p. 145, 1912; Proc. Acad. Nat. Sc. Philad., p. 43, 1913, ♂.
Hab. : Adelaide, S.A. ; Melbourne, V. ; Sydney, N.S.W. ; Brisbane, Q.
- Prosopis cognata** Sm., New Sp. Hym. B.M., p. 18, 1879, ♀ ♂.
Hab. : Champion Bay, Swan River, W.A.
- *Prosopis constricta** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 468, 1905, ♂; Ann. Mag.
Nat. His. (8), vi, p. 31, 1910; Mem. Queensl. Mus., vi, p. 113, 1918.
Hab. : Mackay, Brisbane, Caloundra, Q.
- Prosopis constrictiformis** Ckll., Ann. Mag. Nat. His. (8), vi, p. 27, 1910, ♂.
Hab. : Cooktown, Q.
- Prosopis coronata** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 469, 1905, ♂; Ann. Mag.
Nat. His. (8), vi, p. 162, 1910, ♀.
Hab. : Mackay, Q.
- Prosopis coronatula** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 471, 1914, ♂.
Hab. : Brewarrina, N.S.W.
- Prosopis cyaneomicans** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 165, 1910, ♀.
Hab. : Mackay, Q.
- *Prosopis cyaneomicans var. nigrescens** Ckll., Mem. Queensl. Mus., vi, p. 113, 1918.
Hab. : Bribie Island, Caloundra, Q.
- Prosopis cyanophila** Ckll., Ann. Mag. Nat. His. (8), vi, p. 28, 1910, ♂.
Hab. : Mackay, Q.
- *Prosopis daveyi** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 85, 1921, ♀.
Hab. : Bright, V.
- *Prosopis disjuncta** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 400, 1905, ♂; Ann. Mag.
Nat. His. (8), vi, p. 30, 1910, ♀; Mem. Queensl. Mus., vi, p. 113, 1918.
Hab. : Mackay, Caloundra, Stradbroke Island, Brisbane, Q.
- Prosopis distractus** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 56, 1914, ♂.
Hab. : Yallingup, W.A.
- Prosopis dromedarius** Ckll., Jour. Ent. Soc. New York, xviii, p. 103, 1910, ♂.
Hab. : Adelaide, S.A.
- *Prosopis eburniella** Ckll., Ann. Mag. Nat. His. (8), ix, p. 148, 1912, ♂; Mem. Queensl.
Mus., v, p. 198, 1916; Mem. Queensl. Mus., vi, p. 113, 1918.
Hab. : Sydney, N.S.W. ; Brisbane, Stradbroke Island, Caloundra, Q.
- Prosopis elongata** Sm., New Sp. Hym. B.M., p. 18, 1879, ♂; Ann. Mag. Nat. His.
(8), xvii, p. 435, 1916.
Hab. : Victoria ; Adelaide, S.A. ; Kalamunda, W.A.

***Prosopis eugeniella** Ckll., Ann. Mag. Nat. His. (8), vi, p. 25, 1910, ♀; Mem. Queensl. Mus., vi, p. 113, 1918.

Hab. : Mackay, Brisbane, Q.

Prosopis extensa Ckll., Proc. Acad. Nat. Sc. Philad., p. 364, 1916, ♀.

Hab. : Mount Yule, Healesville, V.

Prosopis flavojugata Ckll., Ann. Mag. Nat. His. (8), ix, p. 146, 1912, ♀.

Hab. : Como, N.S.W.

***Prosopis frederici** Ckll.

Prosopis similis Sm., Cat. Hym. B.M., i, p. 26, 1853. (Not of Fabr., 1793.)

Prosopis frederici Ckll., n.n. Ann. Mag. Nat. His. (7), xvi, p. 403, 1905.

Hab. : Brisbane, Q.

Prosopis fulvicornis Sm., Cat. Hym. B.M., i, p. 27, 1853, ♂ not ♀; Ckll., Ann. Mag. Nat. His. (8), xv, p. 347, 1915; Ann. Mag. Nat. His. (8), xvii, p. 435, 1916.

Hab. : Adelaide, S.A. ; Kalamunda, W.A.

Prosopis hæmatopoda Ckll., Proc. Acad. Nat. Sc. Philad., p. 42, 1913, ♀.

Hab. : South Australia.

Prosopis hobartiana Ckll., Ann. Mag. Nat. His. (7), xvi, p. 470, 1905, ♂.

Hab. : Hobart, T.

Prosopis honesta Sm., New Sp. Hym. B.M., p. 19, 1879, ♂.

Hab. : Tasmania.

Prosopis indicator Ckll., Jour. New York Ent. Soc., xviii, p. 103, 1910, ♂ ♀.

Hab. : Mallee, V. ; Adelaide, S.A.

Prosopis infans Ckll. (*microphenax* var. ?), Ann. Mag. Nat. His. (8), vi, p. 27, 1910.

Hab. : Mackay, Q.

Prosopis itamuca Ckll., Ann. Mag. Nat. His. (8), vi, p. 163, 1910, ♀.

Hab. : N. W. Australia.

Prosopis kalamundæ Ckll., Ann. Mag. Nat. His. (8), xv, p. 346, 1915, ♀.

Hab. : Kalamunda, W.A.

***Prosopis kelvini** Ckll., Ann. Mag. Nat. His. (8), x, p. 489, 1912, ♀.

Hab. : Brisbane, Q.

Prosopis lateralis Sm., New Sp. Hym. B.M., p. 23, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 467, 1905.

Hab. : Champion Bay, W.A. ; Adelaide, S.A. ; Mackay, Q.

Prosopis leai Ckll., Ann. Mag. Nat. His. (8), x, p. 490, 1912, ♂.

Hab. : National Park, N.S.W.

Prosopis leucosphæra Ckll., Proc. Acad. Nat. Sc. Philad., p. 42, 1913, ♀.

Hab. : Croydon, V.

Prosopis littleri Ckll., Ann. Mag. Nat. His. (9), i, p. 163, 1918, ♂.

Hab. : George Town, T.

Prosopis lubbocki Ckll.

Prosopis metallica Sm., Trans. Ent. Soc. Lond., p. 59, 1862, ♂ not ♀.

Prosopis lubbocki Ckll., n.n. Ann. Mag. Nat. His. (7), xvi, p. 403, 1905.

Hab. : Australia.

Prosopis mediovirens Ckll., Proc. Acad. Nat. Sc. Philad., p. 39, 1913, ♀ ♂; Ann.

Mag. Nat. His. (9), i, p. 163, 1918, ♂.

Hab. : Purnong, S.A. ; Launceston, T.

***Prosopis melanops** Ckll., Mem. Queensl. Mus., v, p. 198, 1916, ♀.

Hab. : Caloundra, Brisbane, Q.

Prosopis microphenax Ckll., Ann. Mag. Nat. His. (8), vi, p. 26, 1910, ♂.

Hab. : Mackay, Q.

Prosopis microphenax var. A Ckll., Ann. Mag. Nat. His. (8), vi, p. 26, 1910, ♂.

Hab. : Mackay, Q.

Prosopis minuscula Ckll., Proc. Acad. Nat. Sc. Philad., p. 38, 1913, ♂.

Hab. : Croydon, V.

***Prosopis morosa** Sm., New Sp. Hym. B.M., p. 26, 1879, ♀; Ckll., Ann. Mag. Nat.

His. (8), ix, p. 146, 1912, ♀.

Hab. : Liverpool Plains, Como, N.S.W. ; Brisbane, National Park, Q.

Prosopis nigropersonata Ckll., Ann. Mag. Nat. His. (8), vi, p. 27, 1910, ♀.

Hab. : Mackay, Q.

***Prosopis nubilosa** Sm., Cat. Hym. B.M., i, p. 31, 1853, ♀; Ckll., Ann. Mag. Nat.

His. (8), vi, p. 25, 1910.

Hab. : Port Phillip, V. ; Brisbane, Stradbroke Island, Caloundra, Q.

Prosopis nubilosa subnubilosa Ckll., Ann. Mag. Nat. His. (8), vi, p. 25, 1910, ♀; Ann.

Mag. Nat. His. (8), vi, p. 161, 1910, ♂.

Hab. : Mackay, Q.

Prosopis nubilosella Ckll., Ann. Mag. Nat. His. (8), vi, p. 161, 1910, ♀.

Hab. : Mackay, Q.

***Prosopis nubilosella mediosticta** Ckll., Ann. Mag. Nat. His. (8), ix, p. 145, 1912, ♀;

Mem. Queensl. Mus., vi, p. 113, 1918.

Hab. : Botany, N.S.W. ; Stradbroke Island, National Park, Q.

***Prosopis obtusata** Sm., New Sp. Hym. B.M., p. 17, 1879, ♀.

Hab. : Swan River, W.A. ; Brisbane, Stradbroke Island, Q.

- Prosopis pachygnatha** Ckll., Ann. Mag. Nat. His. (8), vi, p. 29, 1910, ♀.
Hab. : Cooktown, Mackay, Q.
- ***Prosopis perhumilis** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 53, 1914, ♂ ♀; Ann. Mag. Nat. His. (9), i, p. 163, 1918.
Hab. : Yallingup, W.A. ; Brisbane, Q.
- ***Prosopis perhumilis var. A**, Ckll., The Entomologist, p. 306, 1914, ♂.
Hab. : Bridport, Launceston, T.
- Prosopis permiranda** Ckll., Ann. Mag. Nat. His. (8), iv, p. 396, 1909, ♀.
Hab. : Kuranda, Q.
- ***Prosopis perplexa** (Sm.).
Prosopis confusa Sm., Cat. Hym. B.M., i, p. 30, 1853, ♀ (*non* Nylander).
Prosopis perplexa Sm., Cat. Hym. B.M., ii, p. 421, 1854.
Prosopis perplexa Ckll., Ann. Mag. Nat. His. (8), ix, p. 146, 1912, ♀.
Hab. : Mosman's Bay, Hornsby, N.S.W. ; Bribie Island, Q.
- Prosopis philoleuca** Ckll., Ann. Mag. Nat. His. (8), vi, p. 163, 1910, ♀.
Hab. : Mackay, Q.
- Prosopis primulipicta** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 471, 1905, ♂.
Hab. : Mackay, Q.
- Prosopis proxima** Sm., New Sp. Hym. B.M., p. 24, 1879, ♀.
Hab. : Champion Bay, W.A.
- Prosopis proxima var. A** Ckll., Proc. Acad. Nat. Sc. Philad., p. 43, 1913, ♀.
Hab. : Purnong, S.A.
- Prosopis pulchricrus** Ckll., Ann. Mag. Nat. His. (8), xv, p. 266, 1915, ♂.
Hab. : Yarrawin, N.S.W.
- ***Prosopis pulchripes** Ckll., Insecutor Inscitiæ Menstruus, ii, p. 97, 1914, ♂.
Hab. : Brisbane, Caloundra, Q.
- Prosopis purpurata** Sm., New Sp. Hym. B.M., p. 17, 1879, ♂.
Hab. : Adelaide, S.A.
- ***Prosopis quadrata** Sm., Cat. Hym. B.M., i, p. 28, 1853, ♂.
Hab. : Brisbane, Q.
- Prosopis quadriceps** Sm., New Sp. Hym. B.M., p. 17, 1879, ♀.
Hab. : Australia.
- Prosopis quadriceps var. A** Ckll., Ann. Mag. Nat. His. (8), ix, p. 145, 1912.
Hab. : New South Wales.
- Prosopis rollei** Ckll., Jour. New York Ent. Soc., xviii, p. 105, 1910, ♂; Ann. Mag. Nat. His. (8), vi, p. 162, 1910.
Hab.: Ararat, V.

Prosopis rotundiceps Sm., New Sp. Hym. B.M., p. 19, 1879, ♀; Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 235, 1907, ♂.

Hab. : Melbourne, V.

Prosopis ruficeps Sm., Cat. Hym. B.M., i, p. 29, 1853, ♀.

Hab. : Adelaide, S.A.

Prosopis rufipes Sm., Cat. Hym. B.M., i, p. 27, 1853, ♀; Ckll., Jour. New York Ent. Soc., xviii, p. 101, 1910, ♂.

Hab. : Australia.

Prosopis sanguinipicta Ckll., Ann. Mag. Nat. His. (8), xiv, p. 54, 1914, ♂.

Hab. : Yallingup, W.A.

Prosopis scintilla Ckll., Ann. Mag. Nat. His. (8), ix, p. 147, 1912, ♀; Ann. Mag. Nat. His. (8), xiv, p. 54, 1914, ♂.

Hab. : Mackay, Q.

Prosopis scintilliformis Ckll., Proc. Acad. Nat. Sc. Philad., p. 41, 1913, ♀; Proc. Acad. Nat. Sc. Philad., p. 365, 1916, ♀ ♂.

Hab. : Croydon, Healesville, V.

***Prosopis sculptifrons** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 84, 1921, ♂ ♀.

Hab. : National Park, Q.

***Prosopis serotinella** Ckll., The Entomologist, xxix, p. 17, 1906; Ann. Mag. Nat. His. (8), vi, p. 25, 1910, ♀; Mem. Queensl. Mus., vi, p. 113, 1918.

Hab. : Mackay, Brisbane, Q.

Prosopis simillima Sm., New Sp. Hym. B.M., p. 26, 1879, ♀.

Hab. : Moreton Bay, Q.

Prosopis sublateralis Ckll., Ann. Mag. Nat. His. (8), xiv, p. 471, 1914, ♂.

Hab. : Yarrawin, N.S.W.

Prosopis subplebeia Ckll., Ann. Mag. Nat. His. (7), xvi, p. 469, 1905, ♂.

Hab. : Mackay, Q.

Prosopis trilobata Ckll., Jour. New York Ent. Soc., xviii, p. 104, 1910, ♂.

Hab. : Mallee, V.

Prosopis trimerops Ckll., Proc. Acad. Nat. Sc. Philad., p. 365, 1916, ♀.

Hab. : Yallingup, W.A.

Prosopis varicolor Sm., New Sp. Hym. B.M., p. 24, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 399, 1905, ♂.

Hab. : Port Bowen, Townsville, Q.

Prosopis violacea Sm., Cat. Hym. B.M., i, p. 26, 1853, ♀ ♂.

Hab. : Swan River, W.A.

Prosopis vittatifrons Ckll., Proc. Acad. Nat. Sc. Philad., p. 39, 1913, ♀; Proc. Acad. Nat. Sc. Philad., p. 365, 1916.

Hab. : Purnong, S.A. ; Perth, W.A.

Prosopis xanthaspis Ckll., Ann. Mag. Nat. His. (8), vi, p. 160, 1910, ♀; Ckll., Ann. Mag. Nat. His. (8); ix, p. 147, 1912, ♂.

Prosopis xanthaspis var. *bicuneata* Ckll., Ann. Mag. Nat. His. (8), viii, p. 769, 1911, ♀.

Prosopis bicuneata Ckll., Ann. Mag. Nat. His. (8), vi, p. 161, 1910, ♀.

Hab. : Mackay, Q.

Prosopis xanthosphæra Ckll., Proc. Acad. Nat. Sc. Philad., p. 41, 1913.

Hab. : King Island, T.

Genus **STILPNOSOMA** Sm., New Sp. Hym. B.M., p. 16, 1879.

Stilpnosoma lævigatum Sm., New Sp. Hym. B.M., p. 16, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 296, 1905, ♀.

Hab. : Mackay, Q.

***Stilpnosoma semisericea** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 476, 1905, ♀.

Hab. : Mackay, Birkdale, Q.

Stilpnosoma turneri Friese., Arkiv. för. Zool. Band ii, p. 4, 1917, ♀.

Hab. : Mackay, Colosseum, Q. ; Adelaide, S.A.

Genus **TURNERELLA** Ckll., The Entomologist, xliii, p. 262, 1910.

Turnerella doddi Perk., Ann. Mag. Nat. His. (8), ix, p. 114, 1912, ♀.

Hab. : Port Darwin, N.T.

Turnerella gilberti Ckll., The Entomologist, xliii, p. 262, 1910, ♂.

Hab. : Mackay, Q.

Division ANDRENIFORMES.

Family ANDRENIDÆ. Subfamily NOMIINÆ.

Genus **NOMIA** Latr., His. Nat., xiii, p. 369, 1805.

Nomia ænea Sm., Trans. Ent. Soc. Lond., p. 63, 1875, ♂.

Hab. : Port Essington, N.T.

Nomia aerata Sm., Trans. Ent. Soc. Lond., p. 63, 1875, ♂.

Hab. : Australia.

Nomia alboscopacea Friese., Arkiv. för. Zool. Band ii, p. 6, 1917, ♂.

Hab. : Mackay, Colosseum, Atherton, Q.

Nomia argentifrons Sm., Trans. Ent. Soc. Lond. (3), i, p. 60, 1862-54

Hab. : Australia.

Nomia aurantifer Ckll., Ann. Mag. Nat. His. (8), v, p. 501, 1910, ♀.

Hab. : Cairns, Kuranda, Q.

***Nomia aurantifer swainsoniæ** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 82, 1921, ♀ ♂.

Nomia luteofasciata Friese., Arkiv. för. Zool. Band ii, p. 7, 1917, ♀.

Hab. : National Park, Cairns, Atherton, Q.

***Nomia australica** Sm., Trans. Ent. Soc. Lond., p. 60, 1875, ♂ ♀.

Hab. : Melbourne, V. ; Brisbane, Stradbroke Island, Q. ; Adelaide, S.A. ;
Swan River, W.A.

***Nomia australica regis** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 221, 1910, ♂.

Hab. : N.W. Australia.

***Nomia brisbanensis** Ckll., Ann. Mag. Nat. His. (8), xii, p. 508, 1913, ♀ ♂.

Hab. : Brisbane, Stradbroke Island, Bribie Island, Q.

Nomia darwinorum Ckll., Ann. Mag. Nat. His. (8), v, p. 502, 1910, ♂.

Hab. : Port Darwin, N.T.

Nomia dentiventris Sm., Trans. Ent. Soc. Lond., p. 62, 1875, ♂.

Hab. : Sydney, N.S.W.

***Nomia dimissa** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 83, 1921, ♀ ♂.

Hab. : Cairns, Q.

***Nomia ferricauda** Ckll., Ann. Mag. Nat. His. (8), xii, p. 507, 1913, ♀.

Hab. : Brisbane, Q.

***Nomia flavoviridis** Ckll., The Entomologist, p. 222, 1905 ; Trans. Amer. Ent. Soc.,
xxxvi, p. 225, 1910, ♀ ♂ ; The Entomologist, p. 119, 1912.

Hab. : Mackay, Brisbane, Stradbroke Island, Bribie Island, Q.

Nomia flavoviridis adalaidella Ckll., Jour. New York Ent. Soc., xviii, p. 106,
1910, ♂ ♀.

Hab. : Adelaide, S.A.

Nomia flavoviridis cyanella Ckll., Ann. Mag. Nat. His. (8), xii, p. 506, 1913, ♂.

Hab. : Cooktown, Q.

Nomia flavoviridis var. doddi Ckll., The Entomologist, p. 222, 1905.

Hab. : Queensland.

***Nomia flavoviridis phanerura** Ckll., Ann. Mag. Nat. His. (8), xii, p. 506, 1913, ♀.

Hab. : Mackay, Brisbane, Stradbroke Island, Sandgate, Q.

Nomia frenchi Ckll., The Entomologist, p. 120, 1912, ♂.

Hab. : Woodend, V.

Nomia generosa Sm., Trans. Ent. Soc. Lond., p. 61, 1875, ♂.

Hab. : Moreton Bay, Q.

Nomia gilberti Ckll., Ann. Mag. Nat. His. (7), xvi, p. 304, 1905, ♀.

Hab. : Mackay, Q.

***Nomia gracilipes** Sm., Trans. Ent. Soc. Lond., p. 61, 1875, ♀ ♂; Westw., Trans. Ent. Soc. Lond., p. 217, 1875, ♂; Ckll., Ann. Mag. Nat. His. (8), xii, p. 507, 1913, ♀; Ckll., Mem. Queensl. Mus., v, p. 200, 1916, ♀.

Hab. : Victoria; Brisbane, Q.; Adelaide, S.A.

Nomia grisella Ckll. (*muscosa*, subsp. ?), Ann. Mag. Nat. His. (8), xii, p. 508, 1913, ♀.

Hab. : Cape York, Q.

***Nomia halictella** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 306, 1905, ♀; The Entomologist, p. 122, 1912, ♂; Mem. Queensl. Mus., vi, p. 116, 1918.

Hab. : Mackay, Brisbane, Q.

Nomia halictella var. **triangularis** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 307, 1905, ♀.

Hab. : Mackay, Q.

Nomia hippophila Ckll., Jour. New York Ent. Soc., xviii, p. 106, 1910, ♂; The Entomologist, p. 158, 1916, ♀.

Hab. : Port Phillip, V.; Yarrawin, N.S.W.

Nomia hippophila purnongensis Ckll., Ann. Mag. Nat. His. (8), xii, p. 505, 1913, ♂.

Hab. : Purnong, S.A.

Nomia hypodonta Ckll., The Entomologist, p. 220, 1905.

Var. **A**, Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 223, 1910, ♂.

Hab. : Mackay, Q.

***Nomia kurandina** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 222, 1910, ♂; The Entomologist, p. 121, 1912, ♀.

Hab. : Cairns, Mackay, Brisbane, Q.

Nomia lepidota Ckll., The Entomologist, p. 218, 1905.

Hab. : Australia.

***Nomia lyonsiæ** Ckll., Ann. Mag. Nat. His. (8), x, p. 491, 1912, ♀.

Hab. : Brisbane, Stradbroke Island, Q.

Nomia melanoptera Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 224, 1910, ♀.

Hab. : Cairns, Kuranda, Q.

Nomia moerens Sm., Trans. Ent. Soc. Lond., p. 60, 1875, ♀; Ckll., Ann. Mag. Nat. His. (8), xii, p. 507, 1913, ♀.

Hab. : Victoria.

***Nomia muscosa** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 224, 1910, ♀; Ann. Mag. Nat. His. (8), xii, p. 505, 1913, ♂.

Hab. : N. S. Wales; Mackay, Brisbane, Stradbroke Island, Q.

Nomia nana Sm., Trans. Ent. Soc. Lond., p. 62, 1875, ♀.

Nomia ruficornis Sm., Trans. Ent. Soc. Lond., p. 62, 1875, ♂.

Nomia nana Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 221, 1910, ♂.

Hab. : Adelaide, S.A. ; Sydney, N.S.W. ; N. W. Australia.

Nomia pseudoceratina Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 222, 1910, ♂.

Hab. : Mackay, Q.

Nomia rubroviridis Ckll., The Entomologist, p. 223, 1905.

Hab. : Australia.

Nomia rufocognita Ckll., The Entomologist, p. 219, 1905.

Hab. : Kuranda, Q.

***Nomia satelles** Ckll., The Entomologist, p. 120, 1912, ♂ ♀.

Hab. : Rutherglen, V. ; Kurrajong, N.S.W.

Nomia semiaurea Ckll., Ann. Mag. Nat. His. (7), xvi, p. 305, 1905, ♀ ; The Entomologist, p. 121, 1912.

Hab. : Mackay, Kuranda, Q.

Nomia semipallida Ckll., The Entomologist, p. 220, 1905.

Hab. : Australia.

Nomia stalkerii Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 223, 1910, ♂.

Hab. : Alexandria, Australia.

Nomia subaustralica Ckll., Jour. New York Ent. Soc., xviii, p. 105, 1910, ♀.

Hab. : Finke River, Tennant's Creek, S.A.

***Nomia submoerens** Ckll., The Entomologist, p. 307, 1914, ♀.

Hab. : Bridport, Eaglehawk Neck, George Town, T.

Nomia tenuihirta Ckll., The Entomologist, p. 219, 1905 ; Ann. Mag. Nat. His. (7), xvi, p. 304, 1905, ♂ ♀.

Hab. : Mackay, Q.

***Nomia tomentifera** (Frieese).

Nomia cincta var. *tomentifera* Frieese., Ann. Mus. Hung., p. 191-207, 1909.

Nomia tomentifera Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 222, 1910, ♂.

Hab. : Kuranda, Cooktown, Dunk Island, Q.

Nomia victoriæ Ckll., Jour. New York Ent. Soc., xviii, p. 107, 1912, ♀.

Hab. : Ararat, V.

Genus **NOMOIDES** Schenck., Berlin, Entom. zeitschr., x, p. 333, 1866.

Nomioides perditellus Ckll., Ann. Mag. Nat. His. (7), xvi, p. 221, 1905, ♀ ; Trans. Amer. Ent. Soc., xxxvi, p. 245, 1910, ♂.

Hab. : Mackay, Q.

Genus REEPENIA Friese. (no reference obtainable).

Reepenia brevicornis (Sm.).

Tetralonia brevicornis Sm., Cat. Hym. B.M., ii, p. 303, 1854, ♂.

Reepenia brevicornis Ckll., Mem. Queensl. Mus. vii, pt. 3, p. 81, 1921.

Hab.: Moreton Bay, Q.

***Reepenia eboracina** Ckll.

Nomia (Reepenia) eboracina Ckll., Ann. Mag. Nat. His. (8), ix, p. 377, 1912, ♂.

Reepenia eboracina Ckll., Mem. Queensl. Mus. vii, pt. 3, p. 81, 1921, ♂.

Hab.: Cape York, Gordonvale, Q.

Subfamily HALICTINÆ.

Genus HALICTUS Latr., His. Nat., xiii, p. 364, 1805.

(Including Subgenus *Chloralictus* Rob., Canad. Ent., xxxiv, p. 248, 1902.).

Halictus asperithorax Ckll., Ann. Mag. Nat. His. (8), vi, p. 274, 1910, ♀.

Hab.: Melbourne, V.

Halictus bassi Ckll., Ann. Mag. Nat. His. (8), xvi, p. 102, 1915, ♂.

Hab.: Mount Wellington, T.

Halictus baudini Ckll., Ann. Mag. Nat. His. (8), xvi, p. 102, 1915, ♂.

Hab.: Mount Wellington, T.

Halictus behri Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 228, 1910, ♀.

Hab.: Port Darwin, N.T.

Halictus behri transvolans Ckll., Ann. Mag. Nat. His. (8), ix, p. 385, 1912.

Hab.: Mackay, Q.

***Halictus bicingulatus** Sm., Cat. Hym. B.M., i, p. 57, 1853, ♀.

Var. A Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 231, 1910, ♀; Ckll., Ann. Mag. Nat. His. (8), xiii, p. 508, 1914.

Hab.: Melbourne, V; Mackay, Brisbane, Q.

***Halictus bicingulatus var. leai** Ckll.

Halictus leai Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 237, 1910, ♀.

Halictus leai Ckll., Proc. Acad. Nat. Sc. Philad., p. 32, 1913, ♂.

Halictus bicingulatus var. *leai* Ckll., Ann. Mag. Nat. His. (8), xiii, p. 508, 1914.

Hab.: Brisbane, Q.

***Halictus blackburni** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 232, 1910, ♂ ♀.

Hab.: Mackay, Q.

Halictus blighi Ckll., Ann. Mag. Nat. His. (8), xvi, p. 102, 1915, ♂.

Hab.: Mount Wellington, T.

Halictus boweni Ckll., Ann. Mag. Nat. His. (8), xvi, p. 103, 1915, ♂.

Hab.: Eaglehawk Neck, T.

- Halictus brazieri** Ckll., Proc. Acad. Nat. Sc. Philad., p. 367, 1916, ♂.
Hab. : Yallingup, W.A.
- ***Halictus brisbanensis** Ckll., Mem. Queensl. Mus., vi, p. 117, 1918, ♀.
Hab. : Brisbane, Q.
- Halictus burkei** Ckll., The Entomologist, p. 58, 1906.
Hab. : Tasmania.
- ***Halictus bursariæ** Ckll., Mem. Queensl. Mus., v, p. 203, 1916, ♂.
Hab. : Brisbane, Caloundra, Q.
- ***Halictus callaspis** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 6, 1915, ♀.
Hab. : Bribie Island, Q.
- ***Halictus caloundrensis** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 505, 1914, ♀.
Hab. : Caloundra, Bribie Island, Q.
- Halictus cambagei** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 236, 1910, ♂.
Hab. : Adelaide, S.A.
- Halictus carbonarius** Sm., Cat. Hym. B.M., i, p. 58, 1853, ♀.
Hab. : Sydney, N.S.W.
- Halictus cassiæfloris** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 514, 1914, ♀.
Hab. : Mackay, Q.
- Halictus chapmani** Ckll., Ann. Mag. Nat. His. (8), vi, p. 273, 1910, ♀.
Hab. : Western Australia.
- Halictus circumdatus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 512, 1914, ♀.
Hab. : Rutherglen, V.
- ***Halictus clarigaster** Ckll., Mem. Queensl. Mus., vi, p. 117, 1918, ♀.
Hab. : Caloundra, Q.
- Halictus clelandi** Ckll., Ann. Mag. Nat. His. (8), vi, p. 272, 1910, ♂.
Hab. : Adelaide, S.A.
- ***Halictus cognatus** Sm., Cat. Hym. B.M., i, p. 59, 1853, ♂.
Hab. : Launceston, T.
- Halictus confusellus** Ckll., Proc. Acad. Nat. Sc. Philad., p. 374, 1916, ♀.
Hab. : Launceston, T.
- Halictus conspicuus** Sm., New Sp. Hym. B.M., p. 34, 1879, ♀.
Hab. : Australia.
- Halictus convexus** Sm., New Sp. Hym. B.M., p. 35, 1879, ♀.
Hab. : Victoria.
- Halictus cyclognathus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 511, 1914, ♂.
Var. A Ckll., Ann. Mag. Nat. His. (8), xvi, p. 97, 1915, ♂.
Hab. : Eaglehawk Neck, T. : Croydon, V.

- ***Halictus cyclurus** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 99, 1915, ♀.
Hab. : Mount Tambourine, Q.
- ***Halictus (Chloralictus) dampieri** Ckll., The Entomologist, p. 270, 1905 ; Trans. Amer. Ent. Soc., xxxvi, p. 228, 1910, ♂ ; Ann. Mag. Nat. His. (8), ix, p. 385, 1912.
Hab. : Mackay, Kuranda, Cairns, Brisbane, Stradbroke Island, Q.
- Halictus davidis** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 234, 1910, ♂ ♀.
Hab. : Cairns, Kuranda, Q.
- Halictus demissus** Ckll., Proc. Acad. Nat. Sc. Philad., p. 371, 1916, ♀.
Hab. : Launceston, T.
- Halictus disclusus** Ckll., The Entomologist, p. 243, 1914, ♂.
Hab. : South-east Tasmania.
- ***Halictus doddi** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 368, 1914, ♀.
Hab. : Kuranda, Q.
- Halictus dolichocerus** Ckll., Proc. Acad. Nat. Sc. Philad., p. 370, 1916, ♂.
Hab. : Yarrawin, N.S.W.
- Halictus dotatus** Ckll., Ann. Mag. Nat. His. (8), ix, p. 384, 1912, ♀.
Hab. : Sydney, N.S.W.
- ***Halictus eboracensis** Ckll., Mem. Queensl. Mus., vi, p. 117, 1918, ♀.
Hab. : Ebor, N.S.W.
- ***Halictus erythrurus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 504, 1914, ♀ ; Ann. Mag. Nat. His. (9), i, p. 165, 1918 ; Mem. Queensl. Mus., vi, p. 116, 1918 ; Ann. Mag. Nat. His. (9), iii, p. 125, 1919, ♀.
Hab. : Croydon, V. ; Launceston, T. ; York, W.A. ; Brisbane, Q.
- ***Halictus erythrurus var. atrocyaneus** Ckll., Mem. Queensl. Mus., vi, p. 117, 1918, ♀.
Hab. : Brisbane, Q.
- Halictus etheridgei** Ckll., Ann. Mag. Nat. His. (8), xvii, p. 433, 1916, ♀.
Hab. : Yallingup, W.A.
- Halictus eurhodopus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 514, 1914, ♀.
Hab. : Cairns, Kuranda, Q.
- Halictus ewarti** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 230, 1910, ♀.
Hab. : Cairns, Kuranda, Q.
- Halictus expansifrons** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 521, 1914, ♂.
Hab. : N.S.W.
- ***Halictus eyrei** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 226, 1910, ♀ ; Mem. Queensl. Mus., vi, p. 116, 1918.
Hab. : Mackay, Brisbane, Caloundra, Q.

Halictus flindersi Ckll., The Entomologist, p. 271, 1905.

Var. A Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 228, 1910.

Hab. : Mackay, Q.

Halictus flindersi leucurus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 366, 1914, ♀.

Hab. : Bribie Island, Q.

Halictus floralis Sm., Cat. Hym. B.M., i, p. 57, 1853, ♀.

Hab. : Australia.

***Halictus forresti** Ckll., The Entomologist, p. 60, 1906; Trans. Amer. Ent. Soc., xxxvi, p. 232, 1910, ♂; Ann. Mag. Nat. His. (8), ix, p. 385, 1912.

Hab. : Mackay, Q.

Halictus forticornis Ckll., Proc. Acad. Nat. Sc. Philad., p. 372, 1916, ♂.

Hab. : Kalamunda, W.A.

Halictus furneauxi Ckll., Ann. Mag. Nat. His. (8), xvi, p. 101, 1915, ♀.

Hab. : Eaglehawk Neck, T.

Halictus gilesi Ckll., The Entomologist, p. 304, 1905.

Hab. : Australia.

Halictus globosus Sm., Cat. Hym. B.M., i, p. 59, 1853.

Hab. : Tasmania.

Halictus granulithorax Ckll., Ann. Mag. Nat. His. (8), xiii, p. 519, 1914, ♀.

Hab. : Victoria.

***Halictus griseovittatus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 509, 1914, ♀.

Hab. : Mackay, Brisbane, Q.

***Halictus hackeriellus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 507, 1914, ♂.

Hab. : Brisbane, Q.

***Halictus hæmatopus** Ckll., The Entomologist, p. 307, 1914, ♂.

Hab. : Launceston, T.

Halictus hæmatostoma Ckll., Ann. Mag. Nat. His. (8), xiii, p. 506, 1914, ♂.

Hab. : Windsor, V.

Halictus hedleyi Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 231, 1910, ♂.

Var. A Ckll., Ann. Mag. Nat. His. (8), xiii, p. 504, 1914, ♂.

Hab. : Cheltenham, Port Phillip, V.

***Halictus helichrysi** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 515, 1914, ♀.

Hab. : Mount Tambourine, Brisbane, Bribie Island, Q.

Halictus holochlorus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 507, 1914, ♀.

Hab. : Cheltenham, V.

Halictus humei Ckll., The Entomologist, p. 303, 1905.

Hab. : Australia.

Halictus (Chloralictus) humilis Sm.

Halictus humilis Sm., New Sp. Hym. B.M., p. 36, 1879, ♀.

Halictus (Chloralictus) humilis Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 228, 1910, ♀.

Hab. : Champion Bay, W.A. ; Adelaide, S.A.

***Halictus idoneus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 517, 1914, ♂.

Hab. : Brisbane, Q.

Halictus imitans Ckll., Ann. Mag. Nat. His. (8), xiii, p. 516, 1914.

Hab. : Victoria ; Tasmania.

Halictus inclinans Sm., New Sp. Hym. B.M., p. 36, 1879, ♀ ; Ckll., Ann. Mag. Nat. His. (8), ix, p. 386, 1912.

Hab. : Champion Bay, W.A. ; Windsor, V.

Halictus instabilis Ckll., Ann. Mag. Nat. His. (8), xiii, p. 510, 1914, ♀.

Hab. : Croydon, V.

Halictus isthmalis Ckll., Ann. Mag. Nat. His. (8), xiv, p. 367, 1914, ♂ ; Ann. Mag. Nat. His. (8), xvi, p. 97, 1915, ♀.

Hab. : Eaglehawk Neck, T.

Halictus kesteveni Ckll., Ann. Mag. Nat. His. (8), ix, p. 386, 1912, ♂.

Hab. : Kuranda, Cairns, Cape York, Q.

Halictus kurandensis Ckll., Ann. Mag. Nat. His. (8), xiii, p. 515, 1914.

Hab. : Cairns, Kuranda, Q.

Halictus lanariellus Ckll., Proc. Acad. Nat. Sc. Philad., p. 373, 1916, ♀.

Hab. : Yarrawin, N.S.W.

***Halictus lanarius** Sm., Cat. Hym. B.M., i, p. 57, 1853, ♀ ; Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 235, 1910, ♀ ♂.

Hab. : Devonport, T. ; Adelaide, S.A. ; Hunter River, N.S.W. ; Brisbane, Mount Tambourine, Q. ; Murwillumbah, N.S.W. ; Launceston, T.

***Halictus lanuginosus** Sm., New Sp. Hym. B.M., p. 34, 1879, ♀ ♂.

Hab. : Brisbane, Mount Tambourine, Q.

***Halictus leichardti** Ckll., The Entomologist, p. 59, 1906 ; Ckll., Ann. Mag. Nat. His. (8), x, p. 486, 1912.

Halictus paracolletinus Ckll., Trans. Amer. Ent. Soc. xxxvi, p. 201, 1910, ♀.

Halictus paracolletinus Ckll., Ann. Mag. Nat. His. (8), ix, p. 387, 1912, ♂.

Hab. : Mackay, Kuranda, Q.

Halictus limatus Sm., Cat. Hym. B.M., i, p. 59, 1853, ♀.

Hab. : Tasmania.

***Halictus littleri** Ckll., The Entomologist, p. 307, 1914, ♀.

Hab. : Launceston, T.

Halictus macrops Ckll., Proc. Acad. Nat. Sc. Philad., p. 373, 1916, ♂.

Hab. : Launceston, T.

Halictus maitlandi Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 233, 1910, ♀.

Hab. : Cairns, Kuranda, Q.

Halictus mediopolitus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 518, 1914, ♀.

Hab. : Murray River, S.A.

Halictus melanopterus Ckll., The Entomologist, p. 243, 1914, ♀.

Hab. : Yallingup, W.A.

Halictus melanurus Ckll., Ann. Mag. Nat. His. (9), iii, p. 125, 1919, ♀.

Hab. : York, W.A.

Halictus mirandus Turn., Ann. Mag. Nat. His. (8), xiv, p. 8, 1914, ♀.

Hab. : Yallingup, W.A.

Halictus mitchelli Ckll., The Entomologist, p. 58, 1906.

Hab. : Tasmania.

Halictus mjobergi Friese., Arkiv. för. Zool. Band ii, p. 5, 1917, ♀.

Hab. : Mt. Tambourine, Q.

Halictus mundulus Ckll., Proc. Acad. Nat. Sc. Philad., p. 366, 1916, ♀.

Hab. : Kalamunda, W.A.

Halictus murrayi Ckll., The Entomologist, p. 272, 1905.

Hab. : Australia.

***Halictus musicus** Ckll., Ann. Mag. Nat. His. (8), xi, p. 540, 1913, ♀.

Hab. : Mount Tambourine, Q.

Halictus nigroscopaceus Friese., Arkiv. för Zool. Band ii, p. 4, 1917, ♂ ♀.

Halictus niveifrons Ckll., Ann. Mag. Nat. His. (8), xiii, p. 520, 1914, ♂.

Hab. : Tasmania.

Halictus oblitus Sm., New Sp. Hym. B.M., p. 35, 1879, ♀.

Hab. : Swan River, W.A.

Halictus opacicollis Ckll., Ann. Mag. Nat. His. (8), xiii, p. 519, 1914, ♀.

Hab. : Hobart, T. ; Victoria.

Halictus orbatus Sm., Cat. Hym. B.M., i, p. 58, 1853, ♀ ; Ckll., Ann. Mag. Nat. His. (8), xiii, p. 511, 1914.

Hab. : Tasmania ; Fern Tree Gully, V.

Halictus oxleyi Ckll., The Entomologist, p. 303, 1905.

Hab. : Australia.

Halictus oxoniellus Ckll., Ann. Mag. Nat. His. (8), xiv, p. 369, 1914, ♀; Mem. Queensl. Mus., vi, p. 116, 1918.

Hab. : Bribie Island, Q.

Halictus pachycephalus Ckll., Proc. Acad. Nat. Sc. Philad., p. 369, 1916, ♂.

Hab. : Yarrawin, N.S.W.

Halictus pavonellus Ckll., Ann. Mag. Nat. His. (8), xvi, p. 5, 1915, ♀.

Hab. : Bribie Island, Q.

***Halictus peraustralis** Ckll., Ann. Mag. Nat. His. (7), xiv, p. 211, 1914, ♀.

Hab. : South Australia ; Brisbane, Stradbroke Island, Q.

Halictus plebeius Ckll., Ann. Mag. Nat. His. (8), xiii, p. 517, 1914, ♀.

Hab. : Murray River, S.A.

***Halictus pulvitectus** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 98, 1915, ♂♀.

Hab. : Eaglehawk Neck, Launceston, T.

Halictus punctatus Sm., New Sp. Hym. B.M., i, p. 36, 1879, ♀; Ann. Mag. Nat. His. (8), ix, p. 384, 1912.

Hab. : Champion Bay, W.A. ; Rutherglen, Melbourne, V. ; Sydney, N.S.W.

Halictus punctatus var. **exlautus** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 300, 1905, ♀.

Hab. : Australia.

Halictus (Chloralictus) purnongensis Ckll., Ann. Mag. Nat. His. (8), xi, p. 393, 1913, ♂.

Hab. : Purnong, S.A.

***Halictus repertulus** Ckll., Mem. Queensl. Mus., v, p. 203, 1916, ♂.

Hab. : Brisbane, Q.

Halictus repertus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 521, 1914, ♂.

Hab. : Melbourne, V.

Halictus repræsentans Sm., Cat. Hym. B.M., i, p. 60, 1853, ♀♂.

Hab. : Australia.

Halictus rowlandi Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 226, 1910, ♀.

Hab. : Cairns, Kuranda, Q.

Halictus rufipes Sm., Cat. Hym. B.M., i, p. 56, 1853, ♀.

Hab. : Melbourne, V.

***Halictus rufotinctus** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 7, 1915, ♀.

Hab. : Brisbane, Q.

Halictus sanguinipes Ckll., Ann. Mag. Nat. His. (8), xiii, p. 513, 1914.

Hab. : Windsor, V.

Halictus saycei Ckll., Ann. Mag. Nat. His. (8), ix, p. 386, 1912.

Hab. : Mackay, Q.

Halictus seductus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 512, 1914, ♀.

Hab. : Windsor, V. ; Tasmania.

***Halictus semipolitus** Ckll., Mem. Queensl. Mus., v, p. 202, 1916, ♀ ; Mem. Queensl. Mus., vi, p. 116, 1918.

Hab. : Bribie Island, Brisbane, Q.

Halictus semipolitus expulsus Ckll., Proc. Acad. Nat. Sc., Philad. p. 372, 1916, ♀.

Hab. : Georgetown, T.

***Halictus speculellus** Ckll., Mem. Queensl. Mus., vi, p. 117, 1918, ♀.

Hab. : Brisbane, Q.

Halictus spenceri Ckll., Proc. Acad. Nat. Sc. Philad., p. 368, 1916, ♂.

Hab. : Yallingup, W.A.

Halictus sphecodoides Sm., Cat. Hym. B.M., i, p. 58, 1853, ♀.

Hab. : Australia.

Halictus sphecodopsis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 300, 1905, ♂.

Hab. : Mackay, Q.

Halictus stirlingi Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 232, 1910, ♀.

Hab. : Mackay, Q.

***Halictus sturti** Ckll., The Entomologist, p. 59, 1906 ; Ann. Mag. Nat. His. (8), ix, p. 386, 1912, ♀.

Hab. : Mackay, Q.

***Halictus subinclinans** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 8, 1915, ♀.

Hab. : Launceston, T.

Halictus supralucens Ckll., Proc. Acad. Nat. Sc. Philad., p. 371, 1916, ♀.

Hab. : Kalamunda, W.A.

Halictus tamburinei Friese., Arkiv. för. Zool. Band ii, p. 6, 1917, ♂ ♀.

Hab. : Mt. Tambourine, Q.

Halictus tasmaniae (Ckll.)

Sphecodes tasmaniae Ckll., Ann. Mag. Nat. His. (7), xvi, p. 299, 1905, ♂.

Halictus tasmaniae Ckll., Trans. Amer. Ent. Soc. xxxvi, p. 231, 1910.

Halictus tasmaniae Ckll., Ann. Mag. Nat. His. (9), i, p. 165, 1918.

Hab. : Hobart, St. Helens, T.

Halictus tatei Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 227, 1910, ♀.

Hab. : Mackay, Q.

Halictus tertius D.T.

Halictus rufipes Sm., Cat. Hym. B.M., i, p. 56, 1853, ♀ (*nec* Fabr., *nec* Schenck).

Halictus tertius D.T., Cat. Hym., x, p. 86, 1896; Ckll., Ann. Mag. Nat. His. (8), xiii, p. 508, 1914.

Hab.: Melbourne, V.

***Halictus (Chloralictus) urbanus** Sm.

Halictus urbanus Sm., New Sp. Hym. B.M., p. 35, 1879, ♀.

Halictus (Chloralictus) urbanus Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 227, 1910; Mem. Queensl. Mus., vi, p. 116, 1918.

Hab.: Champion Bay, W.A.; Port Darwin, N.T.; Sydney, N.S.W.; Brisbane, Q.

Halictus (Chloralictus) urbanus baudinensis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 307, 1905, ♀.

Hab.: Baudin Island, N. W. Australia.

***Halictus (Chloralictus) urbanus var. stradbokensis** Ckll., Proc. Acad. Nat. Sc. Philad., p. 366, 1916, ♀.

Hab.: Stradbroke Island, Bribie Island, Q.

Halictus victoriellus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 517, 1914, ♀.

Hab.: Victoria.

***Halictus vitripennis** Sm., New Sp. Hym. B.M., p. 34, 1879, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 301, 1905, ♀; Ann. Mag. Nat. His. (8), xiii, p. 504, 1914, ♀, *var. A*; Mem. Queensl. Mus., vi, p. 116, 1918.

Hab.: Champion Bay, W.A.; Purnong, V.; Mackay, Brisbane, Q.

Halictus vividus Sm., New Sp. Hym. B.M., p. 35, 1879, ♀ ♂.

Hab.: Swan River, W.A.

Halictus warburtoni Ckll., The Entomologist, p. 58, 1906.

Hab.: Tasmania.

Halictus waterhousei Ckll., Ann. Mag. Nat. His. (8), xvi, p. 4, 1915, ♀ ♂.

Hab.: Woodford, N.S.W.

Halictus willsi Ckll., The Entomologist, p. 59, 1906.

Hab.: Australia.

Halictus woodsi Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 229, 1910, ♂ ♀.

Hab.: Cooktown, Q.; Port Darwin, N.T.

Genus MELLITIDIA Guér., Voy. Coq. Zool., ii, p. 269, 1830.

Mellitidia australis (Guér.).

Andrena australis Guér., Voy. Coq. Zool., ii, p. 269, 1830.

Mellitidia australis Sm., Cat. Hym. B.M., i, p. 119, 1853.

Hab.: Australia.

Genus *STENOTRITUS* Sm., Cat. Hym. B.M., i, p. 119, 1853.

Stenotritus elegans Sm., Cat. Hym. B.M., i, p. 119, 1853, ♀.

Var. A Ckll., Ann. Mag. Nat. His. (8), xiii, p. 136, 1914.

Hab. : Sydney, N.S.W. ; Tennant's Creek, Cent. Australia.

**Stenotritus elegantior* Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 91, 1920.

Hab. : Queensland.

Stenotritus smaragdinus Sm., Trans. Ent. Soc. Lond., p. 254, 1868, ♀ ; Brenchly,
Cruise of the Curaçoa, p. ?, 1873, ♀ T. 45 F. 6.

Hab. : Champion Bay, W.A.

Subfamily SPHECODINÆ.

Genus *PARASPHECODES* Sm., MSS. Cat. Hym. B.M, i, p.39, 1853.

Parasphecodes adalaidæ Ckll., Ann. Mag. Nat. His. (7). xvi, p. 297, 1905, ♀.

Hab. : Adelaide, S.A.

Parasphecodes altichus Sm., Cat. Hym. B.M., i, p. 42, 1853, ♂.

Hab. : Tasmania.

Parasphecodes arciferus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 142, 1914, ♀.

Hab. : Mordialloc, V.

**Parasphecodes atronitens* Ckll., The Entomologist, p. 242, 1914, ♀.

Hab. : Caloundra, Q.

Parasphecodes atrorufescens Ckll., Ann. Mag. Nat. His. (8). xiii, p. 145, 1914. ♀.

Hab. : Purnong, V.

**Parasphecodes aurantiacus* Ckll., Mem. Queensl. Mus., v, p. 200, 1916, ♀.

Hab. : Brisbane, Q.

Parasphecodes basilautus Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 242, 1910, ♀ ♂.

Hab. : Cairns, Kuranda, Q.

**Parasphecodes bribiensis* Ckll., Mem. Queensl. Mus., v, p. 201, 1916, ♀ ; Mem.
Queensl. Mus., vi, p. 118, 1918.

Hab. : Bribie Island, Stradbroke Island, Q.

Parasphecodes bryotrichus Ckll., Ann. Mag. Nat. His. (8), ix, p. 225, 1912, ♀.

Hab. : Cheltenham, V.

**Parasphecodes bryotrichus sordidulus* Ckll., Ann. Mag. Nat. His. (8), xiv, p. 369,
1914.

Hab. : Brisbane, Q.

**Parasphecodes callomelittinus* Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 237, 1910, ♀ ;
Mem. Queensl. Mus., vii, pt. 3, p. 88, 1921.

Hab. : Melbourne, V. : Bribie Island, Q.

- Parasphecodes cervicalis** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 96, 1915, ♀.
Hab. : Eaglehawk Neck, T.
- ***Parasphecodes cirriferus** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 241, 1910, ♀.
Hab. : Victoria.
- Parasphecodes contaminatus** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 238, 1910, ♂.
Hab. : Cairns, Kuranda.
- Parasphecodes dissimulator** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 145, 1914, ♀.
Hab. : Carrom, V.
- Parasphecodes exultus** Ckll., P.L.S. N.S.W., xxxvii, p. 596, 1912 ; Ann. Mag. Nat. His. (8), xii, p. 373, 1913, ♀.
Hab. : Magnet, Mount Wellington, T.
- Parasphecodes frenchi** Ckll., Ann. Mag. Nat. His., (7), xiv, p. 210, 1904.
Hab. : Melbourne, V.
- Parasphecodes froggatti** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 296, 1905, ♂.
Hab. : Victoria ; Bathurst, V.
- Parasphecodes fultoni** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 143, 1914, ♀.
Hab. : Croydon, V.
- ***Parasphecodes fumidicaudus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 144, 1914, ♀.
Hab. : Stradbroke Island, Brisbane, Bribie Island, Q.
- Parasphecodes hilactus** Sm., Cat. Hym. B.M., i, p. 39, 1853, ♂.
Hab. : Swan River, W.A.
- Parasphecodes hiltacus** Sm., Cat. Hym. B.M., i, p. 39, 1853, ♂.
Hab. : Australia.
- Parasphecodes hybodinus** Ckll., Ann. Mag. Nat. His. (8), ix, p. 227, 1912, ♂.
Hab. : Windsor, V.
- Parasphecodes infrahirtus** Ckll., Ann. Mag. Nat. His. (9), v, p. 118, 1920, ♀.
Hab. : Launceston, T.
- ***Parasphecodes insculptus** Ckll., Mem. Queensl. Mus., vi, p. 118, 1918, ♀.
Hab. : Mount Tambourine, Q.
- Parasphecodes lathius** Sm., Cat. Hym. B.M., i, p. 40, 1853, ♀.
Hab. : Australia.
- ***Parasphecodes latissimus** Ckll., Ann. Mag. Nat. His. (8), xvi, p. 96, 1915, ♀.
Hab. : Bridport, T.
- ***Parasphecodes leptospermi** Ckll., Mem. Queensl. Mus., v, p. 202, 1916, ♀.
Hab. : Brisbane, Q.

- Parasphecodes lichatus** Sm., Cat. Hym. B.M., i, p. 40, 1853, ♀.
Hab. : Western Australia.
- Parasphecodes lithusca** Sm., Cat. Hym. B.M., i, p. 41, 1853, ♀.
Hab. : Tasmania.
- Parasphecodes loweri** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 298, 1905, ♀.
Hab. : Adelaide, S.A.
- Parasphecodes melbournensis** Ckll., Ann. Mag. Nat. His. (7), xiv, p. 210, 1914.
Hab. : Melbourne, V.
- Parasphecodes microdontus** Ckll., Ann. Mag. Nat. His. (8), ix, p. 226, 1912, ♀.
Hab. : Melbourne, V.
- Parasphecodes noachinus** Ckll., Ann. Mag. Nat. His. (8), xiii, p. 144, 1914, ♀.
Hab. : Ararat, V.
- Parasphecodes perustus** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 52, 1914, ♂.
Hab. : Mount Wellington, T.
- Parasphecodes plorator** Ckll., Ann. Mag. Nat. His. (8), vi, p. 274, 1910, ♀; Ann.
Mag. Nat. His. (8), xiii, p. 143, 1914.
Hab. : Croydon, Melbourne, V. ; Mount Wellington, T.
- Parasphecodes recantans** Ckll., Ann. Mag. Nat. His. (8), ix, p. 227, 1912, ♂.
Hab. : Victoria.
- Parasphecodes recessus** Ckll., Ann. Mag. Nat. His. (8), xiv, p. 51, 1914, ♀.
Hab. : Mount Wellington, T.
- Parasphecodes rhodopterus** Ckll., The Entomologist, p. 306, 1914, ♀.
Hab. : Launceston, T.
- ***Parasphecodes rufotegularis** Ckll., The Entomologist, p. 306, 1914, ♂.
Hab. : Launceston, T.
- Parasphecodes schomburgki** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 239, 1910, ♀.
Hab. : Adelaide, S.A.
- Parasphecodes sextus** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 239, 1910, ♂.
Hab. : Adelaide, S.A.
- ***Parasphecodes speculiferus** Ckll., Ann. Mag. Nat. His. (8), ix, p. 228, 1912, ♀; Mem.
Queensl. Mus., v, p. 201, 1916, ♀.
Var. A Ckll., Ann. Mag. Nat. His. (8), ix, p. 229, 1912, ♀.
Hab. : Victoria ; Sydney, N.S.W. ; Brisbane, Q.
- Parasphecodes stuchila** Sm., Cat. Hym. B.M., i, p. 42, 1853, ♀.
Hab. : Tasmania.
- Parasphecodes sulthica** Sm., Cat. Hym. B.M., i, p. 40, 1853, ♂.
Hab. : Australia.

Parasphecodes talchius Sm., Cat. Hym. B.M., i, p. 42, 1853, ♂; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 296, 1905, ♂.

Hab. : Tasmania.

Parasphecodes taluchis Sm., Cat. Hym. B.M., i, p. 43, 1853, ♀.

Hab. : Tasmania.

Parasphecodes tepperi Ckll., Ann. Mag. Nat. His. (7), xvi, p. 299, 1905, ♀.

Hab. : Adelaide, S.A.

Parasphecodes tilachiformis Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 234, 1907, ♀.

Hab. : New South Wales.

Parasphecodes tilachus Sm., Cat. Hym. B.M., i, p. 41, 1853, ♀.

Hab. : Tasmania.

Parasphecodes tuchilas Sm., Cat. Hym. B.M., i, p. 41, 1853, ♀.

Hab. : Australia.

Parasphecodes turneri Ckll., Ann. Mag. Nat. His. (8), xiv, p. 50, 1914, ♀ ♂.

Hab. : Eaglehawk Neck, T.

Parasphecodes vau Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 242, 1910, ♀.

Hab. : N.W. Australia.

Parasphecodes vermiculatus Ckll., Ann. Mag. Nat. His. (8), xiii, p. 141, 1914, ♂.

Hab. : Victoria.

Parasphecodes vulneratus Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 240, 1910, ♂.

Hab. : Victoria.

Parasphecodes wellingtoni Ckll., Ann. Mag. Nat. His. (8), xiv, p. 49, 1914, ♀.

Hab. : Mount Wellington, T.

Genus SPHECODES Latr., His. Nat., xiii, p. 368, 1805.

***Sphecodes profugus** Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 244, 1910, ♀ ♂.

Hab. : Mackay, Brisbane, Birkdale, Q.

Family NOMADIDÆ.

Genus NOMADA Scop., Annus His. Nat., iv, p. 44, 1770.

Nomada australensis Perk., Ann. Mag. Nat. His. (8), ix, p. 116, 1912, ♂ ♀.

Hab. : Cairns, Mackay, Q.

Family MELECTIDÆ.

Genus CROCISA Jurine, Nouv. méth. class. Hym., p. 239, 1807.

***Crocisa albomaculata** Sm., Trans. Ent. Soc. Lond., p. 258, 1868, ♀.

Hab. : Champion Bay, King George's Sound, W.A.

Crocisa albopicta Ckll., The Entomologist, p. 217, 1910.

Hab. : Mackay, Q.

Crocisa australensis Radl., Bull. Soc. Nat. Moscow, p. 177, 1893, ♀.

Hab. : Australia.

Crocisa beatissima Ckll., Entomological News, p. 46, 1907, ♀.

Hab. : Adelaide, S.A.

***Crocisa cæruleifrons** Kirby.

Var. A Ckll., Ann. Mag. Nat. His. (7), xvi, p. 219, 1905.

Var. B darwini Ckll., Ann. Mag. Nat. His. (7), xvi, p. 219, 1905.

Hab. : Port Darwin, N.T. ; Gordonvale, Dunk Island, Townsville, Stradbroke Island, Q.

Crocisa cæruleopunctata Bl., His. Nat. Insect., iii, p. 411, 1840.

Hab. : Australia.

***Crocisa lamprosoma** Boisd. Voy. de l'Astrolabe, p. 653, 1834.

Crocisa novahollandiæ Lep., His. Nat. Insect. Hym., ii, p. 450, 1841, ♂.

Crocisa lamprosoma Ckll., Ann. Mag. Nat. His. (7), xvi, p. 219, 1905 ; Ann. Mag. Nat. His. (8), xii, p. 372, 1913.

Hab. : Blue Mountains, N.S.W. ; Brisbane, Duaringa, Stradbroke Island, Q.

Crocisa lugubris Sm., New Sp. Hym. B.M., p. 107, 1879, ♀.

Hab. : Australia.

***Crocisa macleayi** Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 232, 1907, ♀.

Hab. : New South Wales ; Brisbane, Buderim Mountain, Q.

Crocisa quadrimaculata Rads., Bull. Soc. Natural. Moscow, p. 171, 1893, ♀ ♂ ; Ckll.,

Jour. New York Ent. Soc. xviii, p. 100, 1910.

Hab. : Finke River, S.A.

Crocisa quartinæ Grib., Bull. Soc. Entom. Ital., xvi, p. 272, 1884, ♀ ♂.

Hab. : Mackay, Cooktown, Q.

Crocisa tineta Ckll., Ann. Mag. Nat. His. (7), xvi, p. 219, 1905, ♀.

Hab. : Toowoomba, Q.

***Crocisa waroonensis** Ckll., Proc. Linn. Soc. N.S.W., p. 594, 1912, ♂ ; Ann. Mag.

Nat. His. (8), xii, p. 373, 1913.

Hab. : Waroona, Swan River, W.A.

Family ANTHOPHORIDÆ.

Genus ANTHOPHORA Latr., His. Nat. Cr. et Ins., xiv, p. 45, 1804.

(Including subgenus *Sarapoda* Latr., Gen. Crust. et Insect., iv, p. 177, 1809)

Anthophora adelaidæ Ckll., Ann. Mag. Nat. His. (7), xvi, p. 397, 1905. ♂

Hab. : Adelaide River, N.T.

**Anthophora æruginosus* Sm., Cat. Hym. B.M., ii, p. 336, 1854, ♀ ♂ : Dours., Monogr. icon. *Anthophora*, p. 82, 1869, ♀ ♂ ; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 295, 1905, ♀ ♂.

Hab. : Bribie Island, Duaringa, Townsville, Gordonvale, Q. ; Port Darwin, N.T. ; Hunter River, N.S.W.

***Anthophora (Saropoda) alpha* Ckll.**

Saropoda alpha Ckll., Ann. Mag. Nat. His. (7), xiv, p. 204, 1904.

Hab. : Toowoomba, Mackay, Q.

****Anthophora (Saropoda) bombiformis* Sm.**

Saropoda bombiformis Sm., Cat. Hym. B.M., ii, p. 318, 1854, ♂ ♀.

Anthophora bombiformis Dours., Monogr. icon. *Anthophora*, p. 202, 1869, ♀ ♂.

Saropoda bombiformis Ckll., Ann. Mag. Nat. His. (7), xvi, p. 296, 1905.

Hab. : Richmond River, N.S.W. ; Toowoomba, Brisbane, Buderim Mtn., Q.

***Anthophora chlorocyanea* Ckll.**

Anthophora cingulata Ckll., Ann. Mag. Nat. His. (7), xvi, p. 397, 1905, ♀.

Anthophora chlorocyanea Ckll., Ann. Mag. Nat. His. (8), xiv, p. 469, 1914.

Hab. : South Australia.

****Anthophora cingulata* (Fabr.).**

Megilla cingulata Fabr., Syst. Piez., p. 332, No. 18, 1804.

Anthophora cincta Dours. (*nec* Fabr.), Mon. Icon. *Anthophora*, p. 58, 1869, ♀

Anthophora emendata Sm., New Sp. Hym. B.M., p. 123, 1879, ♂ (*nec* ♀).

Anthophora emendata Sm., var. *gilberti* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 396, 1905, ♀.

Anthophora cingulata M.-Waldo, Ann. Mag. Nat. His. (8), xiii, p. 58, 1914.

Hab. : Mackay, Brisbane, Blackall Range, Q.

***Anthophora darwini* Ckll., Ann. Mag. Nat. His. (8), v, p. 409, 1910, ♂.**

Hab. : Port Darwin, N.T.

****Anthophora lilacina* Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 84, 1921, ♂.**

Hab. : Kuranda, Q.

****Anthophora pulchra* Sm., Cat. Hym. B.M., ii, p. 335, 1854, ♀.**

Anthophora zonata var. *pulchra* Dours., Monogr. icon. *Anthophora*, p. 190, 1869, ♀.

Anthophora pulchra Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 83, 1921.

Hab. : Brisbane, Stradbroke Island, Tambourine Mountain, National Park, Q.

***Anthophora preissi* Ckll., Jour. New York, Ent. Soc., xviii, p. 107, 1910, ♀.**

Hab. : West Australia.

***Anthophora preissi froggatti* Ckll., Ann. Mag. Nat. His. (8), xiv, p. 468, 1914, ♀.**

Hab. : Brewarrina, N.S.W.

**Anthophora rhodoseymna* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 395, 1905, ♂ :
Ann. Mag. Nat. His. (8), xiv, p. 12, 1914, ♀.

Hab. : Mackay, Brisbane, Pinalba, Q.

Anthophora salteri Ckll., Ann. Mag. Nat. His. (7), xvi, p. 398, 1905, ♂.

Hab. : Parramatta, N.S.W.

Anthophora scymna Grib., Bull. Soc. Entom. Ital., v, p. 79, 1873. ♀ : Ckll., Ann. Mag. Nat. His. (7), xvi, p. 395, 1905.

Hab. : Adelaide, S.A. ; West Australia.

**Anthophora walkeri* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 396, 1905, ♀ ♂.

Hab. : Baudin Island, W.A.

Anthophora zonata L., Syst. Nat., p. 576, 1758 : Ckll., Ann. Mag. Nat. His. (7), xvi, p. 396, 1905 ; Ckll., Ann. Mag. Nat. His. (8), v, p. 412, 1910 ; Ckll., Ann. Mag. Nat. His. (8), vii, p. 491, 1911.

Hab. : Mackay, Q.

Anthophora zonata subcærulea Lep.

Anthophora subcærulea Lep., His. Nat. Insect. Hymén., ii, p. 30, 1841, ♂ ♀.

Anthophora zonata subcærulea Ckll., Ann. Mag. Nat. His. (7), xvi, p. 396, 1905, ♂.

Hab. : West Australia ; Adelaide, S.A. ; Mackay, Q.

Genus GASTROPSIS Sm., Trans. Ent. Soc. Lond. Proc., p. xxxix, 1868 : Ckll., The Can. Entom., p. 304, 1904.

**Gastropsis pubescens* (Sm.).

Oestropsis pubescens Sm., Trans. Ent. Soc. Lond., p. 253, 1868, ♂.

Gastropsis pubescens Sm., Trans. Ent. Soc. Lond. Proc., p. xxxix, 1868.

Gastropsis pubescens Ckll., The Can. Entom., xxxvi, p. 304, 1904, ♂.

Hab. : Western Australia ; Victoria ; Brisbane, Q.

Gastropsis victoriæ Ckll., The Entomologist, xxix, p. 15, 1906.

Var. A Ckll., Ann. Mag. Nat. His. (8), ix, p. 381, 1912, ♂.

Hab. : West Australia.

**Gastropsis victoriæ rufocollaris* Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 91, 1921, ♂.

Hab. : Mallee, V.

Division MEGACHILIFORMES.

Family MEGACHILIDÆ.

Subfamily CÆLIOXYNÆ.

Genus CÆLIOXYYS Latr., Gen. Crust. et Ins., iv, p. 166, 1809.

Cœlioxyys albiceps Friese., Ann. Mus. Hung. (7), p. 268, 1909 ; Ckll., Ann. Mag. Nat. His. (8), v, p. 501, 1910, ♂.

Hab. : Cairns, Q.

- **Cœlioxys albolineata* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 222, 1905, ♀; Ann. Mag. Nat. His. (8), v, p. 501, 1910, ♂.
 Hab.: Kuranda, Mackay, Brisbane, Q.
- Cœlioxys froggatti* Ckll., Proc. Linn. Soc. N. S. Wales, xxxvi, p. 170, 1911, ♀;
 M.-Waldo, Ann. Mag. Nat. His. (8), xiv, p. 458, 1914, ♂ ♀.
 Hab.: Victoria; Eaglehawk Neck, T.; Yallingup, W.A.
- **Cœlioxys reginæ* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 221, ♀; Ann. Mag. Nat. His. (8), v, p. 501, 1910, ♂.
 Hab.: Brisbane, Stradbroke Island, Q.

Subfamily MEGACHILINÆ.

Genus ANDROGYNELLA Ckll., Ann. Mag. Nat. His. (8), vii, p. 313, 1911.

Androgynella detersa (Ckll.). Genotype.

Megachile detersa Ckll., Ann. Mag. Nat. His. (8), vi, p. 283, 1910, ♀.

Androgynella detersa Ckll., Ann. Mag. Nat. His. (8), vii, p. 313, 1911.

Hab.: Mackay, Kuranda, Q.

Genus LITHURGUS Latr., Fam. Nat. Regn. Anim., 1825; Gen. Crust. et Ins., ii, p. 350.

- **Lithurgus atratiformis* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 295, 1905, ♀; Ann. Mag. Nat. His. (7), xvii, p. 529, 1906, ♂; Mem. Queensl. Mus., vi, p. 119, 1918.

Hab.: N. W. Australia; Brisbane, Stradbroke Island, Q.

Lithurgus dentipes Sm., Cat. Hym. B.M., i, p. 146, 1853, ♂.

Hab.: Australia.

Lithurgus rubricatus Sm., Cat. Hym. B.M., i, p. 146, 1853. ♀ ♂; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 295, 1905, ♀.

Lithurgus cognatus Sm., Trans. Ent. Soc. Lond., p. 255, 1868, ♀.

Hab.: Champion Bay, W.A.

Genus MEGACHILE Latr., His. Nat., iii, p. 382, 1802.

- **Megachile abdominalis* Sm., Cat. Hym. B.M., i, p. 169, 1853, ♂; Rad. Bull. Soc. Nat. Moscow, xlvii, p. 143, 1874, ♀ ♂; Ckll., Ann. Mag. Nat. His. (7), xvii, p. 530, 1906.

Hab.: Townsville, Mackay, Brisbane, Q.

Megachile adelaidæ Ckll., Jour. New York Ent. Soc., xviii, p. 111, 1910, ♀.

Hab.: Adelaide, S.A.

Megachile albobasalis Sm., New Sp. Hym. B.M., p. 65, 1879, ♀.

Hab.: Murray Island, Torres Strait.

Megachile annæ castaneipes Friese. Res. de Exped. à la Nouvelle Guinée Zool., v, p. 356, 1908.

Hab. : Queensland.

Megachile apicata Sm., Cat. Hym. B.M., i, p. 172, 1853, ♀; Ckll., The Entomologist, p. 167, 1913, ♂; Bull. Amer. Mus. Nat. His., xxiii, p. 224, 1907; Ann. Mag. Nat. His., xvii, p. 531, 1906 (reported as *modesta*, should be *apicata*).

Hab. : Yallingup, W.A.; Adelaide, S.A.; Mackay, Q.

Megachile atrella Ckll., Ann. Mag. Nat. His. (7), xvii, p. 532, 1906, ♀.

Hab. : Western Australia.

***Megachile aurifrons** Sm., Cat. Hym. B.M., i, p. 168, 1853, ♀; Ckll., Ann. Mag. Nat. His. (8), vi, p. 277, 1910, ♀.

Hab. : Perth, W.A.; Brewarrina, N.S.W.; Mackay, Winton, Q.

Megachile austeni Ckll., Ann. Mag. Nat. His. (7), xvii, p. 539, 1906, ♂; Ann. Mag. Nat. His. (8), vi, p. 282, 1910.

Hab. : Mackay, Cairns, Q.

Megachile australasiæ D.T.

Megachile imitata Sm., Trans. Ent. Soc. Lond., p. 257, 1868 (*nec* Smith 1853).

Megachile australasiæ D.T., Cat. Hym., p. 421, 1896.

Hab. : Champion Bay, W.A.

Megachile axillaris M.-Waldo., Ann. Mag. Nat. His. (8), xv, p. 328, 1915, ♀.

Hab. : Yallingup, W.A.

Megachile barvonensis Ckll., Ann. Mag. Nat. His. (8), xiv, p. 467, 1914, ♂.

Hab. : Yarrawin, N.S.W.

Megachile beutenmulleri Ckll., Amer. Mus. Nat. His., xxiii, p. 222, 1907, ♂.

Hab. : Victoria.

Megachile blackburnii Frgt., Trans. Roy. Soc. S.A., xvi, p. 72, 1893.

Hab. : Central Australia.

Megachile calida Sm., New Sp. Hym. B.M., p. 64, 1879, ♀ ♂.

Hab. : Queensland.

***Megachile canifrons** Sm., Cat. Hym. B.M., i, p. 171, 1853, ♂; Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 88, 1921, ♂.

Hab. : Western Australia; Brisbane, Q.

Megachile captionis Ckll., Ann. Mag. Nat. His. (8), xiv, p. 466, 1914, ♂ ♀.

Hab. : Brewarrina, N.S.W.; Woodend, V.

***Megachile cetera** Ckll., Ann. Mag. Nat. His. (8), ix, p. 220, 1912, ♀; Ann. Mag. Nat. His. (8), xi, p. 537, 1913; Mem. Queensl. Mus., v, p. 204, 1916.

Hab.: Nagambie, Gippsland, V.; Sydney, Cooma, N.S.W.; Brisbane, Bribie Island, Q.

***Megachile chrysopyga** Sm., Cat. Hym. B.M., i, p. 173, 1853, ♀ ♂.

Megachile maculariformis Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 223, 1907, ♀.

Megachile chrysopyga Ckll., Ann. Mag. Nat. His. (8), v, p. 29, 1910.

Hab.: Tasmania; N.S. Wales; Geraldton, Perth, W.A.; Brisbane, Bribie Island, Stradbroke Island, Q.

***Megachile ciliatipes** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 89, 1921, ♂.

Hab.: Brisbane, Kuranda, Q.

Megachile cincturata Ckll., Ann. Mag. Nat. His. (8), ix, p. 222, 1912, ♀ ♂.

Hab.: Cape York, Q.

Megachile clypeata Sm., Cat. Hym. B.M., i, p. 170, 1853, ♀.

Hab.: Busselton, Yallingup, W.A.

Megachile cornifera Rad., Bull. Soc. Nat. Moscow, xlvii, p. 148, 1874; Ckll., The Entomologist, p. 164, 1913, ♂.

Hab.: Southern Cross, W.A.

Megachile cygnorum Ckll., Ann. Mag. Nat. His. (7), xvii, p. 536, 1906, ♂; Ann. Mag. Nat. His. (8), xiv, p. 466, 1914.

Hab.: Perth, W.A.; Adelaide, S.A.; Woodend, V.; N. S. Wales; Mackay, Q.

Megachile darwiniana Ckll., Ann. Mag. Nat. His. (7), xvii, p. 535, 1906.

Hab.: Port Darwin, N.T.

***Megachile derelicta** Ckll., The Entomologist, p. 166, 1913, ♀ ♂.

Hab.: Windsor, V.; Brisbane, Q.

Megachile doddiana Ckll., Ann. Mag. Nat. His. (7), xvii, p. 530, 1906, ♀.

Hab.: Townsville, Q.

Megachile doddiana var. clarkei Ckll., Ann. Mag. Nat. His. (8), xiv, p. 464, 1914, ♀.

Hab.: Geraldton, W.A.

Megachile erythropyga Sm., Cat. Hym. B.M., i, p. 167, 1853, ♀ ♂.

Hab.: Yallingup, Kalamunda, Perth, W.A.

Megachile eucalypti Ckll., Ann. Mag. Nat. His. (8), vi, p. 360, 1910, ♀ ♂.

Hab.: Mackay, Q.

Megachile fabricator Sm., Trans. Ent. Soc. Lond., p. 256, 1868, ♀ ♂.

Hab.: Champion Bay, Kalamunda, Perth, W.A.

- ***Megachile ferox** Sm., New Sp. Hym. B.M., p. 64, 1879, ♂; Ckll., Ann. Mag. Nat. His. (8), xi, p. 531, 1913, ♀; M.-Waldo, Ann. Mag. Nat. His. (8), xv, p. 332, 1915, ♀.
Hab. : Yallingup, W.A. ; Ararat, V. ; Brisbane, Q.
- Megachile fultoni** Ckll., Ann. Mag. Nat. His. (8), xi, p. 535, 1913, ♀ ♂.
Hab. : N. W. Australia ; Purnong, V.
- Megachile fulvomarginata** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 531, 1906, ♀.
Hab. : Mackay, Q.
- Megachile fumipennis** Sm., Trans. Ent. Soc. Lond., p. 257, 1868, ♀.
Hab. : Champion Bay, W.A.
- Megachile fuscitarsis** Ckll., Ann. Mag. Nat. His. (8), ix, p. 223, 1912, ♂.
Hab. : Queensland.
- Megachile gahani** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 537, 1906, ♂.
Hab. : Australia.
- Megachile gilbertiella** Ckll. (*rel apicata*, subsp. ?) Ann. Mag. Nat. His. (8) vi, p. 362, 1910, ♀.
Hab. : Cooktown, Q.
- Megachile glaberrima** Friese, Deutsche ent Zeitschr., p. 217, 1911 : Ckll., Ann. Mag. Nat. His. (8), ix, p. 221, 1912.
Hab. : Cairns, Mackay, Q.
- ***Megachile hackeri** Ckll., The Entomologist, xlvi, p. 166, 1913, ♂ ♀.
Hab. : Brisbane, Stradbroke Island, Q.
- ***Megachile hæmatogastra** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 99, 1921, ♀.
Hab. : Cairns, Q.
- Megachile hampsoni** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 533, 1906, ♀.
Hab. : Freemantle, Yallingup, W.A.
- ***Megachile heliophila** Ckll., Ann. Mag. Nat. His. (8), xii, p. 103, 1913, ♂.
Hab. : Brisbane, Q.
- Megachile henrici** Ckll., The Entomologist, xl, p. 223, 1907, ♀; Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 223, 1907, ♀.
Hab. : Sydney, N.S.W. ; Adelaide, S.A.
- ***Megachile heriadiformis** Sm., Cat. Hym. B.M., i, p. 172, 1853, ♀.
Hab. : Adelaide, S.A. ; Yallingup, W.A.
- Megachile holura** Ckll., Ann. Mag. Nat. His. (8), ix, p. 221, 1912, ♂.
Hab. : Rutherglen, V.

- Megachile horatii** Ckll., The Entomologist, p. 165, 1913, ♂.
Hab. : Southern Cross, W.A.
- Megachile ignita** Sm., Cat. Hym. B.M., i, p. 169, 1853, ♂.
Hab. : Australia.
- Megachile imitata** Sm., Trans. Ent. Soc. Lond., p. 257, 1868, ♀.
Hab. : Champion Bay, W.A.
- Megachile kirbyana** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 537, 1906, ♂.
Hab. : Freemantle, Yallingup, W.A.
- Megachile kurandensis** Ckll., Ann. Mag. Nat. His. (8), vi, p. 359, 1910, ♂.
Hab. : Cairns, Kuranda, Q.
- ***Megachile latericauda** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 88, 1921, ♀ ♂.
Hab. : Swan River, W.A.
- Megachile latipes** Sm., Cat. Hym. B.M., i, p. 169, 1853, ♂.
Hab. : Sydney, N.S.W. ; Adelaide, S.A.
- Megachile leeuwinensis** M.-Waldo., Ann. Mag. Nat. His. (8), xv, p. 330, 1915, ♀ ♂.
Hab. : Yallingup, W.A.
- Megachile leucopyga** Sm., Cat. Hym. B.M., i, p. 173, 1853, ♀.
Hab. : Tasmania.
- Megachile lineatipes** Ckll., Ann. Mag. Nat. His. (8), vi, p. 364, 1910, ♂.
Hab. : Kuranda, Q.
- Megachile longiceps** M.-Waldo., Ann. Mag. Nat. His. (8), xv, p. 332, 1915, ♀.
Hab. : Yallingup, W.A.
- Megachile lucidiventris** Sm., Cat. Hym. B.M., i, p. 168, 1853, ♀.
Hab. : Liverpool Plains, N.S.W.
- ***Megachile mackayensis** Ckll., Ann. Mag. Nat. His. (8), vi, p. 279, 1910, ♀ ♂ : Mem. Queensl. Mus., vii, pt. 3, p. 88, 1921.
Hab. : N. S. Wales ; National Park, Mackay, Q.
- Megachile macleayi** Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 222, 1907, ♀.
Hab. : N. S. Wales.
- ***Megachile macularis** D.T.
Megachile maculata Sm., Cat. Hym. B.M., i, p. 170, 1853, ♀ (*nec* Smith, p. 160).
Megachile macularis D.T., Cat. Hym., x, p. 437, 1896.
Megachile macularis Ckll., Ann. Mag. Nat. His. (7), xvii, p. 533, 1906.
Hab. : Port Philip, V. ; Brisbane, Townsville, Cairns, Kuranda, Q.
- Megachile micrerythra** Ckll., Ann. Mag. Nat. His. (8), vi, p. 281, 1910, ♂ ♀.
Hab. : Port Darwin, N.T.

Megachile modesta Sm.

Megachile modestus Sm., Trans. Ent. Soc. Lond., ii, 3, p. 62, 1862-64, ♀ ♂.

Megachile modesta Ckll., Bull. Amer. Mus. Nat. His. xxiii, p. 224, 1907.

Hab. : Mackay, Q.

***Megachile monstrosa** Sm., Trans. Ent. Soc. Lond., p. 256, 1868 ; Brenchley's Cruise of Curaçoa, p. 463, pl. xlv, fig. 5, 1873, ♀ ; Ckll., Ann. Mag. Nat. His. (7), xvii, p. 531, 1906.

Hab. : Champion Bay, W.A. ; Townsville, Q.

***Megachile mundifica** Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 90, 1921, ♀.

Hab. : National Park, Q.

***Megachile mystacea** (Fabr.).

Apis mystacea Fabr., Syst. Entom., p. 385, 1775.

Megachile mystacea Sm., Cat. Hym. B.M., i, p. 166, 1853, ♀ ♂.

Megachile rufiventris Sm., Cat. Hym. B.M., i, p. 178, 1853, ♀ ♂.

Megachile mystacea Grib., Ann. Mus. Civ. Genova, xvi, p. 235, 1881.

Megachile mystacea Ckll., Ann. Mag. Nat. His. (7), xvii, p. 530, 1906.

Hab. : Port Essington, N.T. ; Townsville, Kuranda, Brisbane, Stradbroke Island, Q.

Megachile nasuta Sm., Trans. Ent. Soc. Lond., p. 258, 1868, ♀.

Hab. : Champion Bay, Yallingup, W.A.

Megachile nasuta argentifer Ckll., Jour. New York Ent. Soc., xviii, p. 110, 1910, ♀.

Hab. : Melbourne, V.

Megachile nigrovittata Ckll., Ann. Mag. Nat. His. (7), xvii, p. 535, 1906, ♂.

Hab. : N.W. Australia.

Megachile oblonga Sm., New Sp. Hym. B.M., p. 65, 1879, ♀.

Hab. : Western Australia.

Megachile obtusa Sm., Cat. Hym. B.M., i, p. 170, 1853, ♂.

Hab. : Yallingup, W.A.

Megachile oculipes Ckll., Ann. Mag. Nat. His. (8), vi, p. 363, 1910, ♂.

Hab. : Perth, W.A. ; Townsville, Q.

Megachile ordinaria Sm., Cat. Hym. B.M., i, p. 174, 1853, ♀.

Hab. : Tasmania.

Megachile pararhodura Ckll., Ann. Mag. Nat. His. (8), vi, p. 278, 1910.

Hab. : Mackay, Q.

Megachile phenacopyga Ckll., Jour. New York Ent. Soc., xviii, p. 109, 1910, ♂ ;
The Entomologist, p. 165, 1913, ♀.

Hab. : Eastern Australia.

- ***Megachile pictiventris** Sm., Cat. Hym. B.M., i, p. 160, 1853, ♀: Sm., New Sp. Hym., p. 65, 1879, ♀.
Megachile senex Sm., Trans. Ent. Soc. Lond. (3), i, p. 61, 1862, ♀ (*nec* 1853 and 1864); Ckll., Ann. Mag. Nat. His. (7), xvii, p. 530, 1906.
 Hab.: Clarence River, N.S.W.; Brisbane, Cairns, Kuranda, Q.
- Megachile preissi** Ckll., Jour. New York Ent. Soc., xviii, p. 110, 1910, ♀.
 Hab.: Eastern Australia.
- Megachile pretiosa** Friese, Ann. Mus. Hung., vii, pp. 222-257, 1909.
 Hab.: Cairns, Q.
- Megachile punctata** Sm., Cat. Hym. B.M., i, p. 168, 1853, ♂.
 Hab.: Australia.
- ***Megachile quinquelineata** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 534, 1906, ♀: Ann. Mag. Nat. His. (8), vi, p. 282, 1910.
 Hab.: Kalamunda, W.A.; Melbourne, V.; Brisbane, Mackay, Kuranda, Cape York, Q.
- Megachile ramulipes** Ckll., Ann. Mag. Nat. His. (8), xi, p. 534, 1913, ♂.
 Hab.: Kewell, V.
- ***Megachile recisa** Ckll., Ann. Mag. Nat. His. (8), xi, p. 534, 1913, ♂.
 Hab.: Kewell, V.; Brisbane, Q.
- Megachile relictata** Ckll., Ann. Mag. Nat. His. (8), xi, p. 538, 1913, ♀.
 Hab.: Tennant's Creek, S.A.
- Megachile remeata** Ckll., Ann. Mag. Nat. His. (8), xi, p. 538, 1913, ♀.
 Hab.: Western Australia.
- Megachile remotula** Ckll., Jour. New York Ent. Soc., xviii, p. 111, 1910, ♀.
 Hab.: Eastern Australia.
- ***Megachile resinifera** M.-Waldo., Ann. Mag. Nat. His. (8), xv, p. 329, 1915, ♀ ♂.
 Hab.: Yallingup, W.A.
- Megachile revicta** Ckll., Ann. Mag. Nat. His. (8), xi, p. 539, 1913, ♀.
 Hab.: Perth, W.A.
- ***Megachile rhodogastra** Ckll., Ann. Mag. Nat. His. (8), vi, p. 283, 1910, ♂.
 Hab.: Mackay, Brisbane, Q.
- ***Megachile rhodura** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 539, 1906, ♂; Ann. Mag. Nat. His. (8), vi, p. 278, 1910, ♀.
 Hab.: Mackay, Caloundra, Brisbane, Q.
- Megachile rufolobata** Ckll., Ann. Mag. Nat. His. (8), ii, p. 536, 1913, ♂.
 Hab.: Perth, W.A.

Megachile rugosa Sm., New Sp. Hym. B.M., p. 65, 1879, ♂.

Hab. : Western Australia.

Megachile semicandens Ckll., Jour. New York Ent. Soc., xviii, p. 108, 1910, ♂.

Hab. : Adelaide, S.A.

***Megachile semiluctuosa** Sm., Cat. Hym. B.M., i, p. 172, 1853, ♀ ♂.

Hab. : Adelaide, S.A. ; Mallee, V.

***Megachile sequior** Ckll., Jour. New York Ent. Soc., xviii, p. 108, 1910, ♂ ; Ann. Mag. Nat. His. (8), vi, p. 278, 1910, ♀.

Hab. : Adelaide, S.A. ; Eidsvold, Q.

Megachile sericeicauda Ckll., Ann. Mag. Nat. His. (8), vi, p. 364, 1910, ♂.

Hab. : Mackay, Q.

***Megachile serricauda** Ckll., Ann. Mag. Nat. His. (8), vi, p. 361, 1910, ♂.

Hab. : Perth, W.A. ; Brisbane, Mackay, National Park, Q.

Megachile sexmaculata Sm., Trans. Ent. Soc. Lond., p. 257, 1868, ♀.

Hab. : Perth, Yallingup, Champion Bay, W.A.

***Megachile simplex** Sm., Cat. Hym. B.M., i, p. 169, 1853, ♀ ; Ckll., Ann. Mag. Nat. His. (8), xi, p. 537, 1913, ♀.

Hab. : Ararat, V. : Brisbane, Q.

***Megachile simpliciformis** Ckll., Mem. Queensl. Mus., vi, p. 119, 1908, ♀.

Hab. : Stradbroke Island, Q.

Megachile speluncarum M.-Waldo., Ann. Mag. Nat. His. (8), xv, p. 329, 1915, ♀.

Hab. : Yallingup, W.A.

Megachile stalkerii Ckll., Ann. Mag. Nat. His. (8), vi, p. 282, 1910.

Hab. : Alexandria, North Australia.

***Megachile subferox** M.-Waldo., Ann. Mag. Nat. His. (8), xv, p. 333, 1915, ♀ ♂.

Hab. : Yallingup, W.A.

***Megachile suffusipennis** Ckll., Ann. Mag. Nat. His. (7), xvii, p. 531, 1906, ♀.

Hab. : Mackay, Brisbane, National Park, Bribie Island, Q.

***Megachile tasmanica** Ckll., Ann. Mag. Nat. His. (8), xvii, p. 277, 1916, ♂ ; Ckll., Mem. Queensl. Mus., vii, pt. 3, p. 88, 1921, ♂.

Hab. : George Town, T. ; Brisbane, Q.

Megachile tomentella Ckll., Ann. Mag. Nat. His. (7), xvii, p. 538, 1906, ♂.

Hab. : Swan River, W.A. ; Victoria.

***Megachile trichognatha** Ckll., Jour. New York Ent. Soc., xviii, p. 112, 1910, ♀ ; Ann. Mag. Nat. His. (8), vi, p. 278, 1910.

Hab. : Kalamunda, W.A. ; Adelaide, S.A. ; Victoria.

Megachile trichognatha tosticauda Ckll., Ann. Mag. Nat. His. (8), ix, p. 221, 1912, ♀.
Hab. : Mackay, Q.

***Megachile ustulata** Sm., Trans. Ent. Soc. Lond., ii, 3, p. 61, 1862-64, ♀.
Hab. : Kuranda, Brisbane, Pialba, Q.

Megachile ustulatiformis Ckll., Ann. Mag. Nat. His. (8), vi, p. 280, 1910, ♂.
Hab. : Kuranda, Q.

Megachile vestitor Ckll., Jour. New York Ent. Soc., xviii, p. 109, 1910, ♂ ; Ann. Mag. Nat. His. (8), xi, p. 538, 1913, ♂.
Hab. : Western Australia ; Eastern Australia.

Megachile victoriæ Ckll., The Entomologist, p. 167, 1913, ♂ ; Ann. Mag. Nat. His. (8), xi, p. 537, 1913, ♂.
Hab. : Victoria.

Megachile waterhousei Ckll., Ann. Mag. Nat. His. (7), xvii, p. 534, 1906, ♀.
Hab. : Mackay, Q.

Genus **THAUMATOSOMA** Sm., Trans. Ent. Soc. Lond, p. 394, 1864.

Thaumatosa callurum Ckll., Ann. Mag. Nat. His. (8), xiv, p. 467, 1914, ♂ ♀.
Hab. : Yarrawin, W.A.

Thaumatosa duboulayi Sm., Trans. Ent. Soc. Lond., i, 3, p. 395, 1864, ♂ ; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 221, 1905 ; M.-Waldo, Ann. Mag. Nat. His. (8) xv, p. 334, 1915, ♀.
Hab. : Yallingup, W.A. ; Port Darwin, N.T.

Thaumatosa turneri M.-Waldo, Ann. Mag. Nat. His. (8), xii, p. 491, 1913, ♂.
Hab. : Kuranda, Mackay, Q. ; Port Darwin, N.T. ; Baudin Island, W.A.

Division XYLOCOPIFORMES.

Family XYLOCOPIDÆ.

Genus **XYLOCOPA** Latr., Nat. His. Ins., iii, p. 379, 1802.

Subgenus **MESOTRICHIA** Westw., Trans. Ent. Soc. Lond., ii, p. 112, 1838.

***Xylocopa (Mesotrichia) bryorum** (Fabr.).

Apis bryorum Fabr., Syst. Entom., p. 381, 1775.

Xylocopa bryorum Sm., Trans. Entom. Soc. Lond., p. 275, 1874, ♀ ♂.

Xylocopa aruana Rits., Tijdschr. v. Entom., xix, p. 178, 1876.

Xylocopa bryorum W. F. Kirby, Ann. Mag. Nat. His. (5), xiii, p. 412, 1884.

Xylocopa bryorum subsp. *dimidiata* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 224, 1905.

Xylocopa bryorum Ckll., Bull. Amer. Mus. Nat. His., xxiii, p. 228, 1907.

Hab. : N. S. Wales ; Brisbane, Stradbroke Island, Dalby, Dunk Island, Cairns, Gordonvale, Cape York, Q.

Genus *LESTIS* Lep., Encycl. Méthod. Insect., x, p. 795, 1825.

**Lestis aerata* Sm.

Lestis aeratus Sm., Trans. Ent. Soc. Lond. (2), i, p. 180, 1851, ♀ ♂.

Lestis aerata Ckll., Ann. Mag. Nat. His. (7), xvi, p. 224, 1905.

Hab. : Hunter River, Sydney, N.S.W. ; Mallee, V.

**Lestis bombylans* (Fabr.).

Apis bombylans Fabr., Ent. Syst., ii, p. 338, 1775.

Centris bombylans Fabr., Syst. Piez., p. 358, 1804.

Lestis bombylans Lep., Encycl. Méthod. Insect., x, p. 795, 1825.

Lestis bombylans Sm., Trans. Ent. Soc. Lond., (2) i, p. 180, 1851, ♀ ♂.

Hab. : Brisbane, Bribie Island, Stradbroke Island, Caloundra, Q.

Family CERATINIDÆ.

Genus *ALLODAPE* Lep., Encycl. Méthod. Insect., x, p. 18, 1825.

**Allodape bribiensis* Ckll., The Entomologist, p. 200, 1914, ♀; Mem. Queensl. Mus. v, p. 204, 1916.

Hab. : Bribie Island, Q.

**Allodape diminuta* Ckll., Ann. Mag. Nat. His. (8), xv, p. 266, 1915, ♂ ♀.

Hab. : Yarrowin, N.S.W. ; Brisbane, Stradbroke Island, Q.

Allodape picta Sm., Cat. Hym. B.M., ii, p. 231, 1854, ♂.

Hab. : Australia.

**Allodape simillima* Sm., Cat. Hym. B.M., ii, p. 229, 1854, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 294, 1905; Ann. Mag. Nat. His. (8), ix, p. 383, 1912, ♂.

Hab. : Western Australia; Brisbane, Stradbroke Island, Mackay, Townsville, Q.

Allodape unicolor Sm., Cat. Hym. B.M., ii, p. 230, 1854, ♀; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 295, 1905.

Hab. : N. W. Australia; Baudin Island, Queensland.

Genus *EXONEURA* Sm., Cat. Hym. B.M., ii, p. 232, 1854.

**Exoneura angophoræ* Ckll., Ann. Mag. Nat. His. (8), ix, p. 224, 1912, ♀.

Hab. : Sydney, N.S.W. ; Brisbane, Q.

**Exoneura angophoræ* var *obliterata* Ckll., Proc. Acad. Nat. Sc. Philad., p. 29, 1913, ♀.

Hab. : Brisbane, Q.

**Exoneura angophoræ occidentalis* Ckll., The Entomologist, p. 200, 1914, ♀.

Hab. : Yallingup, W.A.

***Exoneura aterrima** Ckll.*Exoneura botanica* var. *aterrima* Ckll., Mem. Queensl. Mus., v, p. 204, 1916, ♀.*Exoneura aterrima* Ckll., Mem. Queensl. Mus., vi, p. 119, 1918.

Hab. : Brisbane, Caloundra, Q.

***Exoneura bicolor** Sm., Cat. Hym. B.M., ii, p. 232. 1854, ♀; Ckll., Ann. Mag. Nat.

His. (7), xvi, p. 465, 1905; Ann. Mag. Nat. His. (8), vi, p. 357, 1910, ♂.

Hab. : Franklin, Hobart, T.; Melbourne, V.; Ebor, N.S.W.

Exoneura botanica Ckll., Ann. Mag. Nat. His. (7), xvi, p. 465, 1905, ♀.

Hab. : Botany, N.S.W.

***Exoneura brisbanensis** Ckll., Mem. Queensl. Mus. v, p. 204, 1916, ♀.

Hab. : Brisbane, Caloundra, Q.

Exoneura clarissima Ckll., Ann. Mag. Nat. His. (8), xv, p. 267, 1915, ♂.

Hab. : Yarrowin, N.S.W.

Exoneura concinnula Ckll., Proc. Acad. Nat. Sc. Philad., p. 31, 1913, ♀.

Hab. : N. S. Wales.

Exoneura froggattii Friese, Ent. Nachr., xxv, p. 210, 1899; Ckll., Proc. Acad. Nat.

Sc. Philad., p. 31, 1913, ♀; Ann. Mag. Nat. His. (7), xvi, p. 465, 1905.

Hab. : Thornleigh, N.S.W.

Exoneura fultoni Ckll., Proc. Acad. Nat. Sc. Philad., p. 31, 1913, ♀.

Hab. : Victoria.

***Exoneura gracilis** Ckll., Mem. Queensl. Mus. vi, p. 119, 1918, ♀.

Hab. : Brisbane, Q.

***Exoneura hackeri** Ckll.*Exoneura angophoræ* var. *hackeri* Ckll., Proc. Acad. Nat. Sc. Philad., p. 29, 1913, ♀.*Exoneura hackeri* Ckll., Mem. Queensl. Mus., vi, p. 120, 1918.

Hab. : Brisbane, Caloundra, Q.

***Exoneura hackeri var incerta** Ckll., Mem. Queensl. Mus. vi, p. 120, 1918, ♀.

Hab. : Brisbane, Q.

***Exoneura hamulata** Ckll., Ann. Mag. Nat. His. (7), xvi, p. 466, 1905, ♀; Proc. Acad. Nat. Sc. Philad, p. 30, 1913, ♂.**Var. A**, The Entomologist, p. 308, 1914, ♀, Mem. Queensl. Mus., vi, p. 120, 1918, ♀.

Hab. : Moss Bay, N.S.W.; Stradbroke Island, Brisbane, Caloundra, Q.

***Exoneura insularis** Ckll., The Entomologist, p. 200, 1914, ♀.

Hab. : Stradbroke Island, Q.

**Exoneura melæna* Ckll., Mem. Queensl. Mus., vi, p. 119, 1918, ♀.

Hab. : Caloundra, Q.

**Exoneura ploratula* Ckll., Ann. Mag. Nat. His. (8), ix, p. 224, 1912, ♀; Mem. Queensl. Mus., vi, p. 119, 1918.

Hab. : Sydney, N.S.W. ; Brisbane, Q.

**Exoneura tau* Ckll., Ann. Mag. Nat. His. (7), xvi, p. 466, 1905 ; Mem. Queensl. Mus., v, p. 204, 1916, ♀.

Hab. : Moss Bay, N.S.W. ; Brisbane, Q.

Exoneura turneri Ckll., The Entomologist, p. 199, 1914, ♀.

Hab. : Eaglehawk Neck, T.

Genus *NEOCERATINA*, Perk. Ann. Mag. Nat. His. (8), ix, p. 117, 1912.

Neoceratina australensis Perk., Ann. Mag. Nat. His. (8), ix, p. 117, 1912, ♀.

Hab. : Bundaberg, Q.

Division APIFORMES. (Social Bees.)

Family APIDÆ. Subfamily MELIPONINÆ.

Genus *TRIGONA* Jurine, Nouv. Méth. Class. Hymén., p. 245, 1807.

Trigona angophoræ Ckll., Ann. Mag. Nat. His. (8), ix, p. 225, 1912.

Hab. : Sydney, N.S.W.

Trigona australis Friese, Termes Fuzetek, xxi, p. 430, 1898.

Hab. : Queensland.

Trigona canifrons Sm., Journ. of Proc. Linn. Soc. Zool., ii, p. 51, 1857 ; Ckll., Ann. Mag. Nat. His. (7), xvi, p. 220, 1905.

Hab. : Adelaide River, N.T.

**Trigona carbonaria* Sm., Cat. Hym. B.M., ii, p. 414, 1854.

Hab. : Australia (widely distributed).

**Trigona cassiæ* Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 247, 1910 ; Ann. Mag. Nat. His. (8), ix, p. 139, 1912.

Hab. : Mackay, Caloundra, Brisbane, Q.

Trigona cincta Friese, Termes Fuzetek, xxi, p. 430, 1898 ; Ckll., Trans. Amer. Ent. Soc., xxxvi, p. 247, 1910.

Hab. : Hermannsberg, Finke River, Central Australia.

Trigona essingtoni Ckll., Ann. Mag. Nat. His. (7), xvi, p. 220, 1905.

Hab. : Port Essington, N.T.

Trigona mellipes Friese, Termes Fuzetek, xxi, p. 429, 1898.

Hab. : South Australia.

Subfamily APINÆ.

Genus APIS Linn., Syst. Nat. (Ed. 1a, 1735), Ed. 10a, i, p. 343, 1758.

Type : **Apis mellifera* Linn. 1758 (= *mellifica*, L. 1767, Lmk. 1801, Jrn. 1801, Ltr. 1802-10).

Hab. : All parts of Australia. (Introduced.)

The species listed may be tabulated as follows :—

Family.	Genus.			Species.
Colletidæ	8	..	133	
Prosopididæ	18	..	299	
Andrenidæ	8	..	246	
Nomadidæ	1	..	1	
Melectidæ	1	..	13	
Anthophoridæ	2	..	20	
Megachilidæ	5	..	122	
Xylocopidæ	2	..	3	
Ceratinidæ	3	..	26	
Apidæ	2	..	9	
Total	50	..	872	

NOTES AND ILLUSTRATIONS OF QUEENSLAND FISHES, No. 2.

BY ALLAN R. McCULLOCH, ZOOLOGIST, AUSTRALIAN MUSEUM.

(By permission of the Trustees of the Australian Museum.)

(Plates VIII—XI.)

THE specimens dealt with in the following pages were secured by Captain Hoult during the trawling operations of the Queensland State trawler "Bar-ca-mul." This vessel worked along the entire coast between the southern boundary of the State and Cairns, principally in the ship channels inside the Barrier Reef, but occasionally in the passages through the reef to its outer edge. Captain Hoult found the area between Rockhampton and the Whitsunday Passage to be swarming with small fish of many kinds, but too small to be of commercial value. Even the Cato Bank in the Coral Sea, eastward of Rockhampton, was investigated, but, though the trawl was hauled successfully over the rough coral ground, fish were not secured in payable quantities, and the investigations were brought to an end early in 1921. Line fishing, on the other hand, produced an abundance of large edible fishes, and the ship was sometimes stocked up with supplies so obtained.

FAMILY SYNODONTIDÆ.

GENUS SYNODUS (Gronow) Bloch & Schneider.

The status and affinities of the new species here described may be expressed in the following key:—

- a. Scales larger, l. lat. 43-52.
 - b. Anal fin about as long as the dorsal, with 10-12 rays. . . *intermedius, evermanni, poeyi,*
and *dominicensis.*
 - bb. Anal fin longer than the dorsal, with 15 rays *sageneus.*
- aa. Scales smaller, l. lat. 58-68.
 - c. Anal fin with 8-10 rays.
 - d. Mouth extending little beyond the eye *simulans.*
 - dd. Mouth extending well beyond the eye.
 - e. $4\frac{1}{2}$ -5 scales between the lateral line and the dorsal fin.
 - f. L. lat. 58-61.
 - g. Indian and Pacific Ocean species.
 - h. Eye little wider than interorbital space, and scarcely more than half as long as the snout; body markings indefinite, fins plain *houlti.*
 - hh. Eye much wider than interorbital space, and more than half as long as the snout; body with distinct dark cross-bars, and fins with brown spots *japonicus.*

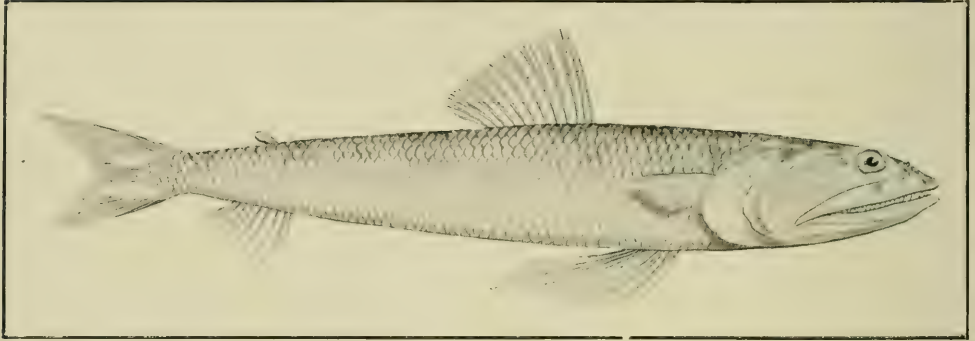


Fig. 1.—*SYNODUS HOULTI* sp. nov. Holotype, 203 mm. long.

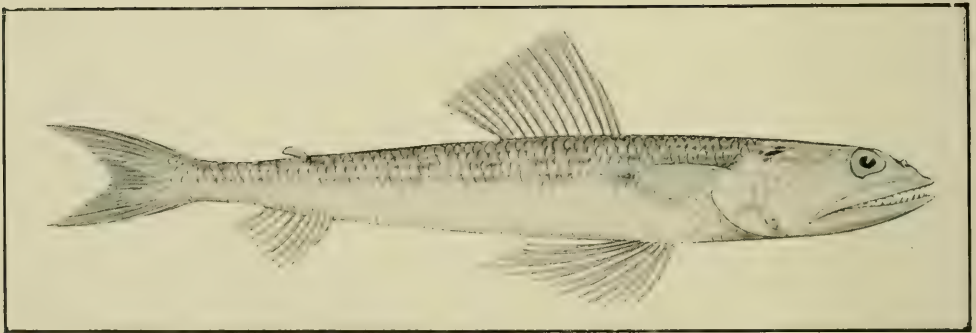


Fig. 2.—*SYNODUS SIMILIS* sp. nov. Holotype, 185 mm. long.

A. R. McCulloch, del.

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- gg. Atlantic Ocean species *synodus and atlanticus*.
 ff. L. lat. 68.
 i. 10 anal rays; light-coloured with dark cross-bars *dermatogenys*.
 ii. 8 anal rays; black with dark cross-bars *lacertinus*.
 cc. $3\frac{1}{2}$ scales between lateral line and dorsal fin.
 j. 11 dorsal and 10 anal rays: snout slightly longer than broad; eye about $4\frac{1}{2}$ in the head *kaianus*.
 jj. 13 dorsal and 8-9 anal rays.
 k. Snout as broad as long; dorsal and caudal fins spotted, gill-membranes plain *indicus*.
 kk. Snout broader than long; dorsal and caudal fins plain, upper part of gill-membranes with black blotches *similis*.
 cc. Anal fin with 11 or more rays *acutus, altipinnis, saurus, scituliceps, jenkinsi, fatens, and lucioiceps*.

The characters of *S. erythræus* Kluninger, from the Red Sea, are unknown to me.

SYNODUS JAPONICUS Houttuyn.

Cobitis japonica Houttuyn, Verh. Holl. Mat. Harlem., xx, 1782, p. 450.

Salmo variegatus Lacepède, Hist. Nat. Poiss., v, 1803, p. 157.

Saurus varius Günther, Brit. Mus. Cat. Fish., v, 1864, p. 395—part.

Synodus japonicus Jordan & Herre, Proc. U.S. Nat. Mus., xxxii, 1907, p. 517—synonymy.

A single specimen 131 mm. long, from Murray Island, Torres Strait, enables me to add this species to the Australian list. Nine others from Lord Howe Island and one from Amboyna agree in having the postoral portion of the cheek naked as in *S. dermatogenys* Fowler, but have eight or nine anal rays instead of ten as in that species. The two species are evidently very similar.

SYNODUS HOULTI sp. nov.

(Plate VIII, fig. 1.)

Br. 15; D. 12; A. 9; P. 13; V. 8; C. 19; L. lat. 59; L. tr. $4\frac{1}{2}$ /7. Depth of the body before the ventrals less than its breadth, and 6.5 in the length to the hypural joint; head 3.3 in the same. Eye 1.8 in the snout, and 8.1 in the head; interorbital width 1.1 in the eye. Third dorsal ray 2.4, and pectoral fin 3 in the head.

Body subcylindrical, a little broader than deep, tapering backwards. Snout pointed, its width at the base distinctly greater than its length; jaws subequal. Nostrils close together, nearer the eye than the end of the snout: the opening of each is quite small, and the first has a posterior cutaneous lobule. Eye with very narrow adipose membranes anteriorly and posteriorly. Interorbital space concave. Cranium with some radiating ridges behind the eye and across the occiput. Mouth oblique, the premaxilla extending about two eye-diameters beyond the eye. Preopercular margin rounded, with a membranous border bearing mucigerous canals. Operculum unarmed, with a membranous border.

A single row of fixed, spaced, and compressed teeth along the outer edge of each premaxillary bone is covered by the lips; directly inside this row is another of longer, more numerous, and depressible teeth which are exposed when the mouth is closed. Mandibular teeth similar, in three rows, the outer row smallest and fixed, the other two depressible and the innermost largest. The symphyses of both jaws are toothless, but there are one or two larger teeth on each side of that of the mandible. A long band of depressible teeth on each palatine bone, arranged in four rows; the innermost teeth are largest, and they increase in size forwards, and are enlarged anteriorly. Tongue covered with large depressible teeth anteriorly, and a band of smaller ones posteriorly.

Body covered with cycloid scales, which have broad membranaceous borders. There are about sixteen rows between the occiput and the dorsal fin. Lateral line straight from the shoulder to the caudal peduncle; its scales are not raised, and are scarcely differentiated from the others. Five or six rows of scales on the cheeks, and a few on the upper portion of the operculum. Some rather elongate scales are present both above and below the base of the pectoral and above that of the ventral; an enlarged pinnate scale on the base of each caudal lobe.

Origin of dorsal fin slightly nearer the adipose dorsal than the tip of the snout; the third and longest ray just reaches the base of the last when adpressed; the two anterior rays are simple, and the last is double. Adipose dorsal finlet inserted above the middle of the anal. All the anal rays are simple, and the last is double. Pectoral fin short, not nearly reaching the vertical of the first dorsal ray. Ventrals inserted about midway between the verticals of the pectoral and dorsal origins; the inner and outer rays are simple and the others are bifid; the sixth ray is longest, and reaches about half its distance from the anal origin, and to the vertical of the last dorsal ray. Caudal forked.

Colour-markings.—Greyish on the back, the sides and lower surfaces white. Some very ill-defined cross-bars on the back, the most prominent of which is at the base of the tail, and some darker markings above the lateral line. Upper surface of the head with vermiculating grey lines which extend onto the lips near the end of the snout. Fins without markings.

Described and figured from the holotype, 203 mm. long from the snout to the end of the middle caudal rays.

Locality.—Near the Capricorn Group, Queensland, 25-30 fathoms.

This species differs from *S. similis* in having a much smaller eye, $4\frac{1}{2}$ instead of $3\frac{1}{2}$ supralateral scales, and small instead of large nostrils. It also lacks the dark marking on the upper portion of the gill-membranes. It is nearer *S. japonicus* Houttuyn, but has a much smaller eye and less rugose cranium, and the characteristic dark body markings and spots on the fins of that species are wanting in *S. houlti*.

SYNODUS SIMILIS sp. nov.

(Plate VIII, fig. 2.)

Br. 15; D. 13; A. 9; P. 13; V. 8; C. 19; L. lat. 58; L. tr. $3\frac{1}{2}/6$. Depth of the body before the ventrals slightly less than its breadth, and about one-seventh of the length to the hypural joint; head 3.5 in the same. Eye 1.2 in the snout, and 5.1 in the head; interorbital width 1.3 in the eye. Third dorsal ray 1.8, third anal ray 3.1, and pectoral fin 2.1 in the head.

Body subcylindrical, a little broader than deep. Snout pointed, its width at the base distinctly greater than its length; jaws subequal. Nostrils close together, nearer the eye than the end of the snout; each has a rather large opening, and the first has a cutaneous lobe posteriorly. Eye with narrow adipose membranes anteriorly and posteriorly. Interorbital space a little concave. Cranium with some radiating ridges behind the eye and across the occiput. Mouth oblique, premaxilla extending about two-thirds of an eye-diameter beyond the eye. Preopercular margin rounded, without a free edge, with numerous mucigerous canals extending from it onto the operculum; operculum unarmed, with a broad membranaceous border.

A single row of fixed, spaced, and compressed teeth along the outer edge of each premaxillary bone is covered by the lips; directly inside this row is another of more numerous, longer, and depressible teeth which are exposed when the mouth is closed. Mandibular teeth similar, in three rows, the outer row smallest and fixed, the other two depressible and the innermost largest. The symphyses of both jaws are toothless, but there are a few enlarged teeth on each side of that of the mandible. A long band of depressible teeth on each palatine arranged in four rows; the innermost teeth are largest and they increase in size forwards and are enlarged anteriorly. Lingual teeth depressible in about five rows anteriorly, the outermost of which are largest; these are followed by a band of small teeth.

Body covered with cycloid scales which have broad membranaceous borders. There are about fifteen between the occiput and the dorsal fin. Lateral line straight from the shoulder to the caudal peduncle; its scales are not keeled, and scarcely differentiated from the others. About five transverse rows of cycloid scales on the cheek, and two on the upper portion of the operculum. A few rather elongate scales both above and below the base of the pectoral fin, and above that of the ventral; an enlarged pennate scale on the base of each caudal lobe.

Origin of the dorsal fin almost midway between the end of the snout and the adipose dorsal; the third and longest ray reaches a little beyond the base of the last when adpressed. The two anterior dorsal rays are simple, and the last is double. Adipose dorsal inserted above the middle of the anal fin. The latter is short and composed of simple rays; the last is double. Pectoral fin short, not quite reaching the vertical of the first dorsal ray. Ventrals inserted between the verticals of the pectoral and dorsal origins; the inner and outer rays are

- d.* At least some of the opercles serrated.
- e.* All the opercles serrated AMPHIPRION.
- ec.* Only the preoperculum and sometimes the preorbital serrated.
- f.* 12-13 dorsal spines.
- g.* Less than 30 transverse series of scales DASYLLUS.
- gg.* More than 30 transverse series of scales LEPIDOZYGUS.
- ff.* 17 dorsal spines ACANTHOCHROMIS.
- dd.* None of the opercles serrated.
- h.* Lateral line not developed on the tail CHROMIS.
- hh.* Lateral line almost complete AZURINA.
- bb.* Teeth more or less compressed.
- i.* Lips greatly thickened, fimbriate, and curled back over the snout .. CHEILOPRION.
- ii.* Lips normal.
- j.* Preoperculum serrated.
- k.* Spinous portions of dorsal and anal scaly like the soft portions; suboperculum and interoperculum entire POMACENTRUS.
1. Teeth biserial, truncate; soft dorsal short, often elevated; caudal deeply forked Subg. POMACENTRUS.
2. Teeth rounded; preorbital notched; caudal lunate Subg. PSEUDOPOMACENTRUS.
3. Teeth uniserial; snout and lower jaw scaly; spinous dorsal with membrane incised and lobed Subg. PARAPOMACENTRUS.
4. Snout and lower jaw naked Subg. AMBLYPOMACENTRUS.
5. Snout scaly, lower jaw naked; teeth uniserial; membrane of spinous dorsal not notched Subg. EUPOMACENTRUS.
6. As above, but membrane of spinous dorsal deeply notched Subg. BRACHYPOMACENTRUS.
- kk.* Spinous portions of dorsal and anal naked; suboperculum and interoperculum serrated DAYA.
- jj.* Preoperculum smooth.
- l.* 30 or less transverse series of scales.
- m.* Suborbitals adnate to the cheeks.
- n.* Suborbitals completely covered by scales NEXILARIUS.
- nn.* Suborbital scales not well formed NEXILOUS.
- mm.* Suborbitals not adnate to the cheeks.
- o.* Teeth emarginate, in a single row GLYPHISODON.
1. Preorbital very narrow, snout rather acute; 12 anal rays Subg. GLYPHISODON.
2. Preorbital broad, snout blunt, 10 anal rays Subg. EUCHISTODUS.
3. Lower pharyngeals quadrate Subg. HEMIGLYPHIDODON.
4. Scales above lateral line in 1-2 rows Subg. AMBLYGLYPHIDODON.
- oo.* Teeth not emarginate.
- p.* Teeth in two rows CHRYSIPTERA.
- pp.* Teeth in one row HYPSPYOPS.
- ll.* More than 30 transverse series of scales PARMA.
- aa.* Teeth uniserial, movable, those of lower jaw confined to front portion.
- q.* Vertical fins not elevated, caudal simply lunate AZURELLA.
- qq.* Vertical fins much elevated, caudal lobes falcate MICROSPATHODON.

GENUS DAYA Bleeker.

Daya Bleeker, Verh. Holl. Mij. Haarlem, 1877, p. 71 (*Pomacentrus jerdoni* Day). *Id.* Weber, Siboga Fische, lvii, 1913, p. 343.

This genus differs from *Pomacentrus* in having no scaly sheaths at the bases of the spinous dorsal and anal fins, and the membrane between the spines naked instead of scaly. The edges of the suboperculum and interoperculum are finely serrated like the preoperculum, and the suborbital bones are small and inconspicuous; operculum with two spines. The anterior teeth of each jaw are enlarged, and, though compressed, have more or less rounded points; the lateral teeth small. Snout and mandible naked. Caudal fin forked. Scales in about thirty rows. Membrane of spinous dorsal scarcely incised and without distinct lobes.

DAYA JERDONI Day.

(Plate IX, fig. 1.)

Pomacentrus jerdoni Day, Proc. Zool. Soc. Lond. 1873, p. 237; and Fish. India, 1877, p. 383, pl. lxxx, fig. 7.

Daya jerdoni Weber, Fische Siboga Exped., lvii, 1913, p. 344.

Pomacentrus dolii Macleay, Proc. Linn. Soc. N.S. Wales vi, 1881, p. 65, pl. i, fig. 1.

D. xiii/13; A. ii/14; P. 18; V. i/5; C. 15; L. lat. 19; 30 scales between the origin of the lateral line and the hypural joint, 5 between the origin of the dorsal and the lateral line, and 10 more to the origin of the anal.

Depth before the ventrals 2.6 in the length to the hypural joint; head 3.5 in the same. Eye 3.4 in the head and a little longer than the snout, which is 4.2 in the head; interorbital width a little greater than the length of the eye, 3.1 in the head. Sixth dorsal spine 2.1 in the head, longer than the last, but much shorter than the ninth ray; pectoral 1.2 in the head.

Body longer than is usual in Pomacentrids, with the upper and lower profiles equally curved from the obtusely conical snout. Suborbital bones small and inconspicuous, the first wider than the others and hinged with the preorbital: free edge of the preorbital notched and feebly serrated. Hinder edge of the preoperculum serrated, as is that of the suboperculum, and the interoperculum also has a few serrations. Operculum armed with two flat spines, the lower of which is the larger. Each jaw with about six large flattened teeth in a row anteriorly, and a row of much smaller ones on each side; palate toothless. Nostril a simple opening on each side.

Scales ctenoid with narrow ciliated borders. They extend forward on the upper surface of the head to before the middle of the eye, and cover the whole head with the exception of the snout, lips, and mandible. There is an enlarged scale at the base of each ventral fin, and two others are present between those fins. Scales cover the bases of the pectoral fins, and extend up between the dorsal, anal, and caudal rays, but the spinous portions of the dorsal and anal are naked. Lateral line formed by a broad canal, with two or three pores opening on each scale; the scales of the median series on the caudal peduncle also bear minute pores.

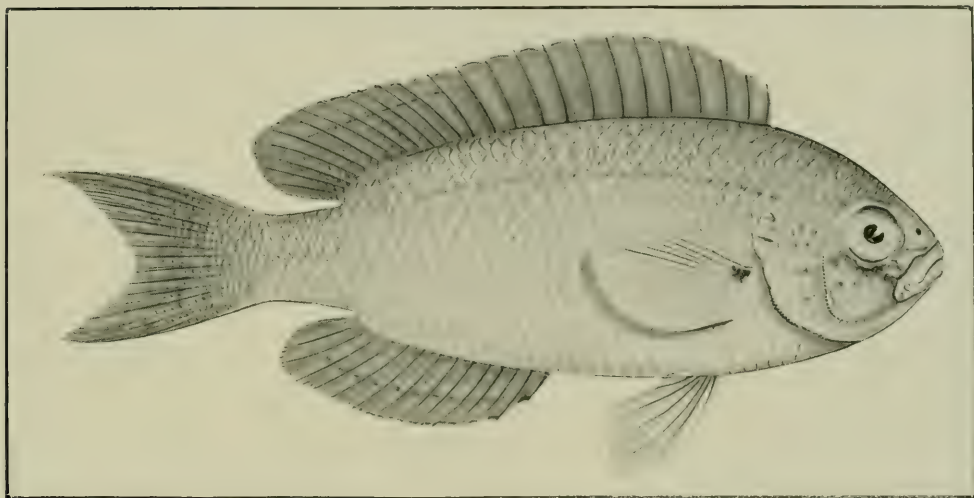


Fig. 1.—DAYA JERDONI Day. A specimen 108 mm. long.

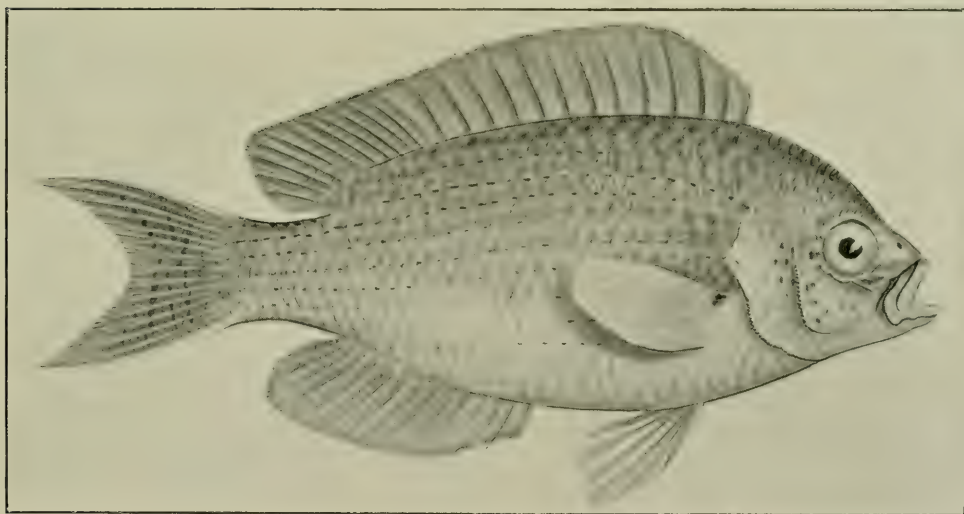


Fig. 2.—DAYA JERDONI, var. FUSCA, var. nov. Holotype of variety, 99 mm. long.

A. R. McCulloch, del.

Median dorsal spines highest, the others decreasing slightly in length backwards; the rays increase again to the ninth, which is longer than the longest spine. The margin of the dorsal fin is slightly sinuous between the spines, and obtusely pointed posteriorly. Anal similar in form to the soft dorsal. Pectoral rounded, the fifth upper ray longest. Ventrals rounded, without produced rays, and reaching backwards to the vent. Caudal forked.

Colour.—Yellow, with blue spots, the fins darker. The body is much lighter than the fins after preservation, and the scales have olivaceous markings which combine to form the pattern illustrated in the accompanying figure. Two dark stripes cross the preorbital, one extending under the eye, and the cheeks and opercles are marked with dark spots and short lines. A large blackish spot at the upper base of the pectoral. Vertical fins slate-coloured in formaline; the dorsal and anal have narrow white borders followed by a very narrow darker line, and there is a blackish spot between the anal spines; a dark horizontal line extends along the soft portion of each. Caudal with irregular rows of grey spots. Pectorals and ventrals whitish.

Described and figured from a specimen 108 mm. long, which was taken by the Queensland State trawler around the Capricorn Group, Queensland, in 25-30 fathoms. Two others taken with it exhibit some little variation in the degree of colour-marking on the fins, and one bears indications of blue spots on each scale; the extreme outer rays of the caudal fin may also be light-coloured.

Synonymy.—An examination of the two typical specimens of *Pomacentrus doli* Macleay, in the Macleay Museum, proves them to be similar in all details to the example described above. They were found in a large *Dolium* shell in Port Jackson, and were doubtless mere stragglers southward from the warmer waters of Queensland.

DAYA JERDONI, var. FUSCA, var. nov.

(Plate IX, fig. 2.)

A series of twenty-one specimens, 59-104 mm. long, which were trawled by the F.I.V. "Endeavour" in Queensland waters, includes several specimens which cannot be separated from those described above; also others which differ somewhat in both form and colour, and others which are intermediate between the two. In a specimen 99 mm. long, which is figured on the accompanying plate, the depth at the ventrals is 2.4 in the length to the hypural joint. The body is brown like the vertical fins, and each scale bears a basal darker (blue) spot. The dark lines on the dorsal and anal are wanting in this specimen, but are indicated in another somewhat larger example. The outer rays of the caudal fin are whitish like the margins of the dorsal and anal.

Although the two forms illustrated differ in their general appearance, they are evidently specifically identical, since other specimens are intermediate between them, and can be as readily assigned to the one as the other.

Localities.—Twenty miles N.N.E. of Double Island Point, Queensland; 30 fathoms.

Thirteen miles S.E. of Cape Capricorn, Queensland; 13 fathoms.

Four to five miles S.E. of Bustard Head Light, Queensland; 11-16 fathoms.

Ten miles N.W. of Bustard Head Light, Queensland; 14-17 fathoms.

Three to seven miles N.W. of Hervey Bay fairway buoy, Queensland; 9-11 fathoms.

Twelve miles N.E. of Bowen, Queensland; 19-25 fathoms.

Port Jackson, New South Wales: types of *P. doli* Macleay.

GENUS GLYPHISODON Lacépède.

GLYPHISODON PALMERI Ogilby.

(Plate X, fig. 1.)

Glyphisodon palmeri Ogilby, Mem. Qld. Mus., ii, 1913, p. 87, pl. xxii, fig. 2.

As the original figure of this species is imperfect in several details, I have figured another specimen, 135 mm. long from the snout to the end of the middle caudal rays, which is well preserved though it has lost many of its scales. Fourteen specimens, 42-135 mm. long, show that the disposition of the transverse bands and the other characters of the species are very constant, and indicate that *G. palmeri* is a valid species.

Localities.—This species is evidently not uncommon on the Queensland Coast. I have speared it among coral on the surface of the reef at Masthead Island, while the Queensland State trawler has taken it in 25-30 fathoms near the Capricorn Group. It has also been taken in a hauling net on a beach at Cape Bedford and in a reef pool near-by on Two Isles.

Capricorn Group, surface to 30 fathoms. Caloundra. Cape Bedford. Two Isles, off Cape Bedford. Torres Strait. Sweers Island, Gulf of Carpentaria.

FAMILY SCORPÆNIDÆ.

GENUS PARACENTROPOGON Bleeker.

? *Hypodytes* Gistel, Naturg. des Thierreichs, viii, 1848. Genotype uncertain, *vide* Jordan, Gen. Fish., ii, 1919, p. 235.

Paracentropogon Bleeker, Versl. Akad. Amsterdam (2), ix, 1876, p. 297 (*Apistus longispinis* Cuv. & Val.).

Daia Ogilby, Proc. Roy. Soc. Qld. xviii, 1903, p. 9 (*Centropogon indicus* Day).

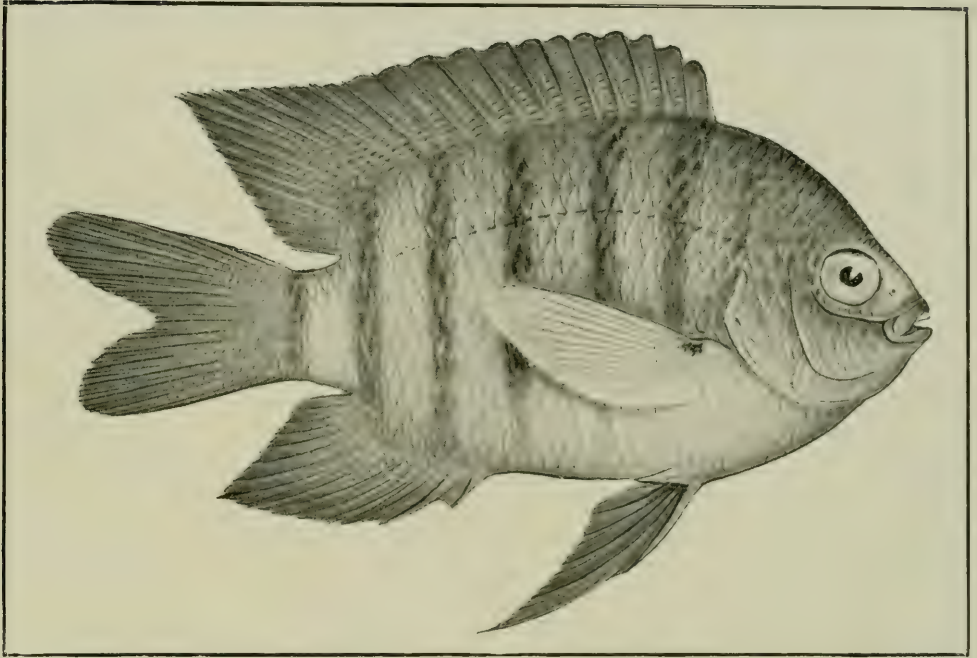


Fig. 1.—*GLYPHISODON PALMERI* Ogilby. A specimen 135 mm. long.

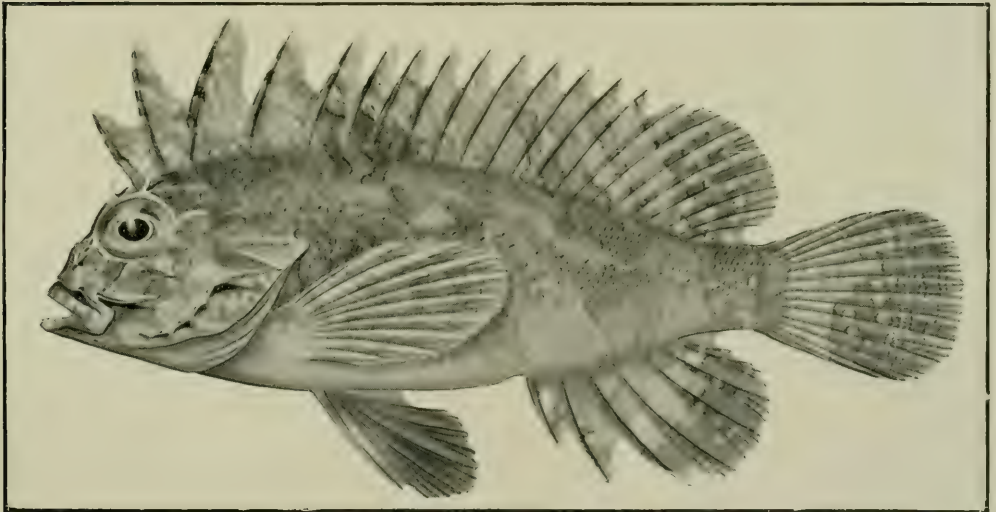


Fig. 2.—*PARACENTROPOGON VESPA* Ogilby. Holotype?, 87 mm. long.

A. R. McCulloch, del.

PARACENTROPOGON VESPA Ogilby.

(Plate X, fig. 2.)

Paracentropogon vespa Ogilby, New Fish. Qld. Coast, 1910, p. 116.

Br. 7; D. xiv/8; A. iii/5; P. 10; V. 1/4; C. 13; 22 tubular pores, on the lateral line between its origin and the hypural joint, and 1 on the base of the caudal.

Depth before the ventral fins almost 3 in the length to the hypural joint; head, to the end of the opercular lobe, 2.7 in the same. Eye 3.7 in the head, and slightly longer than its distance from the end of the snout. Interorbital space much less than the length of the snout, 1.5 in the eye. Third dorsal and anal spines equal in length to the anterior dorsal and anal rays, and 1.6 in the head. Pectoral fin 1.1 in the head.

Profile very oblique from the snout to the origin of the dorsal fin, with a depression above the premaxillary processes. Interorbital space with two bony ridges on the upper end of which are two short tentacles; behind these is a median ridge before the first dorsal spine. Supraorbital ridges very prominent, each with a short tentacle. Another ridge extends backward from the upper margin of the orbit, and there are two short ridges between the eye and the origin of the lateral line. Mandible projecting very slightly beyond the premaxillaries. Mouth oblique, maxilla extending backward to below the anterior third of the eye. Anterior nostril situated just behind the middle of the snout, with a short dermal tentacle; posterior nostril preceded by a large open pore, and placed just in front of the eye. Preorbital with two spines directed backward, the anterior short, the posterior large and reaching to below the hinder portion of the eye. Suborbital bone flat and unarmed. Preoperculum with five spines, the uppermost of which extends well beyond the middle of the operculum; the others are small and scarcely project beyond the rounded preopercular edge. Operculum with two diverging ridges which end in obtuse spines; its posterior portion forms a narrowly rounded lobe. Minute pores open on the preopercular margin between each spine, while others are placed symmetrically on the head and neck above and behind the eye, and on the cheek, preorbital, and mandible. A broad band of minute teeth on each of the premaxillaries and one on each side of the mandible; a Λ -shaped patch of similar teeth on the vomer, and a patch on the end of each palatine bone. In the specimen described and figured there is a rounded patch of teeth attached to the palatal membranes in the angle of the vomerine patch, but this is not developed in other specimens. Pseudobranchiae well developed; no slit behind the last gill-arch.

The back is highest at the base of the fifth dorsal spine, behind which it descends evenly to the caudal peduncle. Head, anterior portion of the back, pectoral region, and abdomen naked, but imperfect scales are present beneath the skin on the greater portion of the sides and caudal peduncle. Lateral line extending in an oblique line from the shoulder to the middle of the caudal peduncle; it forms a complete canal from which minute tubules open obliquely upwards.

First dorsal spine inserted over the middle of the eye; the first five spines are widely separated though connected by membrane; the third is longest, is but little longer than the last, and is as long as the anterior dorsal and anal rays. Soft dorsal rounded, formed of branched rays, of which the last is broadly united with the caudal peduncle by membrane. Anal originating below the twelfth dorsal spine, its third spine as long as that of the dorsal; soft portion rounded. the last ray united with the caudal peduncle. Pectoral formed of branched rays, the median of which are longest and almost reach the vertical of the anal origin. Ventrals inserted behind the bases of the pectorals, each with a strong spine and four branched rays, the longest of which reach the vent. Caudal rounded, with ten branched rays.

Colour-marking.—Light brown after preservation, variegated with darker brown marblings; these are not well defined in the specimen described so they have been copied from another taken with it and of the same size in the accompanying figure. A darker patch is present on the dorsal fin between the fifth and eighth spines, and the whole of the fin is marked with oblique wavy cross-bands. A light spot is situated above the lateral line over the posterior half of the pectorals. Pectorals and caudal with darker cross-bars, the basal portion of the latter whitish. Ventrals blackish with a light patch near the middle of the spine and anterior ray.

Described and figured from a specimen in the "Endeavour" collection, 87 mm. long, of which both the length and data differ from those given by Ogilby. No specimen in the collection agrees exactly with his description, which was prepared under unfavourable conditions on board the "Endeavour," and it is not improbable that this specimen is the actual type of the species.

Affinities.—This species is very similar to *P. longispinis*, with a small and bleached example of which I have been able to compare it, though its third dorsal spine is proportionately shorter. In all other structural details the two appear to be similar, but colour differences may be found which will maintain them as separate species.

P. vespa differs from *P. rubripinnis* in having much finer teeth, lower anterior dorsal spines, better developed scales, and in colouration. The black dorsal spot is largely restricted to the dorsal fin instead of descending onto the back, and the ventrals are dark instead of light in colour.

Localities.—Platypus Bay, Queensland; 7-9 fathoms. "Endeavour" collection, two specimens.

Rat Island, Port Curtis, Queensland; coll. A. R. McCulloch. One specimen with abnormal dorsal spines, but exhibiting all the other characters shown in the figure.

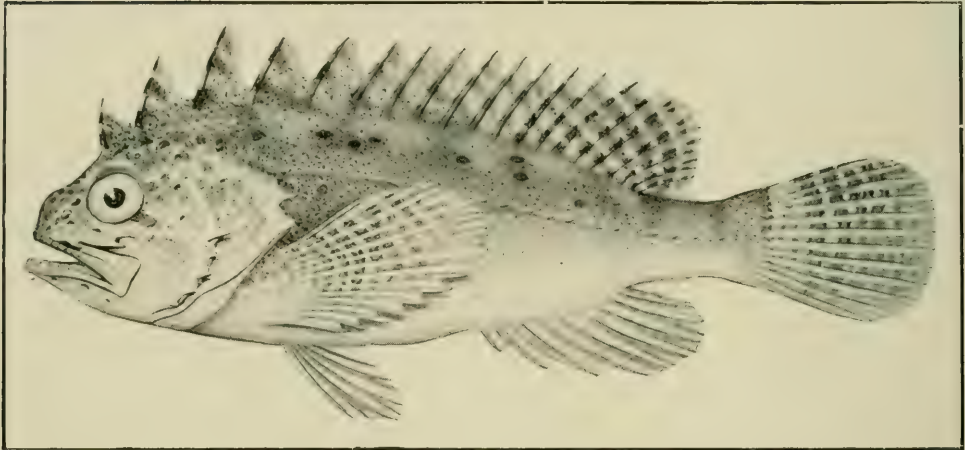


Fig. 1.—*LIOCRANIUM SCORPIO* Ogilby. Holotype, 75 mm. long.

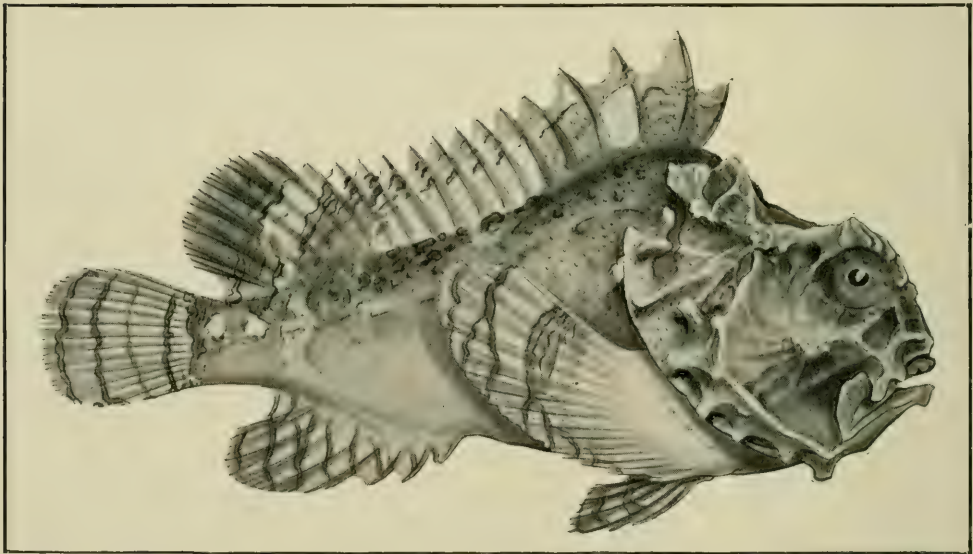


Fig. 2.—*EROSA EROSA* Cuvier & Valenciennes. Holotype of *E. IRIDEA* Ogilby, 80 mm. long.
A. R. McCulloch, del.

GENUS LIOCRANIUM Ogilby.

Lioocranium Ogilby, Proc. Roy. Soc. Qld., xviii, 1903, p. 24 (Orthotype *L. præpositum* Ogilby).

Id. McCulloch, Biol. Res. Endeavour, iv, 4, 1916, p. 195.

- a. Diameter of eye much greater than width of interorbital space; gill-rakers of first arch short, thick, and rounded *præpositum*.
 aa. Diameter of eye much less than width of interorbital space; gill-rakers of first arch long, slender, and flattened *scorpio*.

LIOCRANIUM SCORPIO Ogilby.

(Plate XI, fig 1.)

Paracentropogon scorpio Ogilby, New Fish. Qld. Coast, 1910, p. 115.

Br. 7; D. xiv/6; A. iii/7; P. 6/8; V. i/4; C. 13; 22 to 24 tubules on the lateral line between the shoulder and the hypural joint.

Depth before the ventrals 3 in the length to the hypural joint; head, to the end of the opercular lobe, 2.6 in the same. Eye 4.3 in the head, slightly shorter than the snout, which is 3.5 in the head. Interorbital width greater than the length of the snout, 3.1 in the head. Third dorsal spine and third anal spine 2.4 in the head, and a little shorter than the fourteenth dorsal spine. Pectoral 1.1, caudal 1.2 in the head.

Snout with a prominent hump caused by the posterior processes of the premaxillaries; interorbital space broad and slightly convex, with a median bony ridge which is bifurcate anteriorly. The back is highest at the bases of the fourth and fifth dorsal spines, and thence descends evenly to the caudal peduncle. Mandible projecting beyond the premaxillaries when the mouth is closed. Mouth oblique; maxilla broad, its hinder margin oblique, the upper posterior angle reaching a trifle beyond the vertical of the hinder margin of the eye. Eye with prominent bony margins. Nostrils in the posterior half of the snout, separated by a narrow interspace, the anterior with a dermal lobe. Preorbital with two spines directed backward, the posterior large and reaching beyond the middle of the eye. Suborbital ridge unarmed. Preoperculum with five spines, the uppermost of which is largest; the others decrease in size downwards, and the lowest is minute. Operculum a weak flat bone without ridges or spines, and terminated by a pointed lobe. Minute pores open on the preopercular margin between each spine, while others are placed symmetrically on the head and neck above and behind the eye, on the preorbital and mandible. A band of villiform teeth in each jaw which is interrupted at the symphysis; vomer with a curved patch of similar teeth, palatines toothless. No slit behind the last gill-arch; about fifteen gill-rakers on the lower limb of the first gill-arch, the posterior of which are slender and flattened and about half as long as the eye.

Skin almost naked, only rudimentary scales appearing on the sides of the body and caudal peduncle. Lateral line extending obliquely from the shoulder to the middle of the caudal peduncle, and terminating on the base of the tail; it forms a complete canal from which small tubules extend obliquely upwards and backwards.

First dorsal spine inserted over the anterior third of the eye; the first four spines are widely separated but connected by membrane, and the third is but little shorter than the last though distinctly longer than those immediately before and after it. The first dorsal ray is as long as the last spine, and is unbranched; the four following rays are bifurcate, while the last is simple and joined by membrane to the caudal peduncle. Anal fin originating below the thirteenth dorsal spine: its spines increase in length backward, and the third is about as long as the last dorsal spine but distinctly shorter than the succeeding rays. Soft portion of the anal rounded; its two outer rays are simple and the others bifurcate, and the last is united with the caudal peduncle by membrane. Pectoral rounded, its middle rays longest and reaching to the vertical of the anal origin; five of the upper rays are bifurcate, and the eight lower ones are simple and thickened. Ventrals inserted behind the bases of the pectorals, each with a strong spine and four weak rays, of which three are bifurcate; the longest does not nearly reach the vent. Caudal rounded, with eleven branched rays.

Colour.—Light brown changing to whitish below, with a paler stripe along the back at the base of the dorsal spines; some very indefinite darker cross-bands are apparent on the back which become more distinct on the caudal peduncle. Some irregularly placed dark-brown spots with lighter edges are scattered over the neck and back above the lateral line, and several lighter ones occur on the scapular region. Upper surface and sides of head closely covered with rounded brown spots with lighter edges, some larger ones of which are situated above the operculum and one at the postero-inferior angle of the eye. Lips crossed by pale-brown narrow bands. Spinous dorsal irregularly marbled with brown, and crossed by oblique darker-brown bands which become narrower and more numerous on the soft portion, and coalesce so as to leave only a series of white spots on the rays. Anal with a few light-brown cross-bars on the rays. Pectoral and caudal fins barred with dark brown. Ventrals whitish.

Described and figured from the holotype of the species, which is 75 mm. long from the snout to the end of the tail. It differs in several small details from Ogilby's description owing to the fact that the latter was written on board the "Endeavour," where the conditions rendered accuracy impossible.

Variation.—A second specimen 79 mm. long differs in having the third dorsal spine distinctly longer than the last; the cross-bands on the back are more distinct, and the spots of the head extend on to the lower portion of the sides of the body. A third specimen, 99 mm. long, has only six anal rays; its light dorsal stripe is more pronounced and it has no dark spots on the back or sides, while the head markings are reduced to brown rings around pale pinkish spots; the fin-markings also are more or less obsolete.

Affinities.—This species differs from *Paracentropogon*, in which genus it was placed by Ogilby, in the absence of palatine teeth and the form of its

operculum and pectoral fins. It is clearly related to *Liocranium prepositum* Ogilby. *Paracentropogon cynocephalus* Weber¹ is perhaps only the young of *L. scorpio*.

Localities.—Fourteen miles S.E. of Cape Capricorn, Queensland; 13 fathoms. "Endeavour" collection, holotype.

Near Bowen, Queensland. "Endeavour" collection, paratype.

Capricorn Group, Queensland; 25-30 fathoms. Queensland State trawler.

GENUS SEBASTOPSIS Gill.

SEBASTOPSIS GUAMENSIS Quoy and Gaimard.

Sebastopsis guamensis Jordan & Seale, Bull. U.S. Fish. Bureau, xxv, 1905, p. 374. *Id.* McCulloch, Rec. Austr. Mus. ix, 3, 1913, p. 388.

Sebastopsis scabra Jordan & Seale, Bull. U.S. Fish Bureau, xxv, 1905, p. 374, fig. 71. (Not *Sebastes scaber* Ramsay & Ogilby.)

Centropogon echinatus Macleay, Proc. Linn. Soc. N.S.Wales, v, 3, 1881, p. 436. *Id.* Ogilby, Proc. Roy. Soc. Qld. xviii, 1903, pp. 8, 9.

An examination of the type of *Centropogon echinatus* in the Macleay Museum proves it to be specifically identical with *Sebastopsis guamensis*. Its identity was suggested to me by Mr. J. Douglas Ogilby in 1916, but, as he does not appear to have recorded the synonymy, I take this opportunity of doing so.

Locality.—Endeavour River Estuary, North Queensland.

GENUS EROSA Swainson.

EROSA EROSA (Langsdorf) Cuvier & Valenciennes.

(Plate XI, fig. 2.)

Erosa erosa Jordan & Starks, Proc. U.S. Nat. Mus., xxvii, 1904, p. 156, fig. 16. *Id.* McCulloch, Rec. Austr. Mus. xii, 8, 1919, p. 177.

Erosa iridea Ogilby, New Fish. Qld Coast, 1910, p. 113.

Br. 6; D. xiv/7; A. iii/6; V. i/4; P. 15; C. 14. Depth at the origin of the dorsal fin 2.1 in the length to the hypural joint. Width of the head between the bony bosses of the cheeks almost as great as its length, which is 2.2 in the length to the hypural joint. Eye shorter than its distance from the premaxillary symphysis, and equal to about half the interorbital width. Third dorsal spine 3.2 in the head and as long as the last, which is considerably shorter than the rays.

Head with bony structures arranged as in the figure; the nape is hollowed out into a large quadrangular depression which is widest posteriorly, and is bounded anteriorly by an interorbital bridge. Maxilla broad and reaching backward to below the posterior third of the eye. A band of villiform teeth on each jaw, and a patch on the vomer; palatines toothless. Gill-membranes broadly united with the isthmus.

¹Weber, Siboga Rept., Pisces, lvii, 1913, p. 500, fig. 103.

Back elevated anteriorly, somewhat hollowed in the middle. Body naked, the upper portion of the sides covered with numerous warts and minute papillæ. Lateral line marked by a groove with eleven papillæ along its length, the last being on the base of the tail. A row of papillæ across the base of the pectoral. Each ventral with a rounded knob at the base of its spine.

Colour-marking arranged as shown in the figure.

The above characters are taken from the holotype of *Erosa iridca* Ogilby, 80 mm. long, which is figured on Plate XI. A second example, 102 mm. long, only differs in having its colour-markings rather better defined.

Synonymy.—As already noted (*loc. cit.*), I have compared the holotype of *E. iridca* with a small Japanese example of *E. crosa* and find no characters to distinguish them as separate species.

Localities.—Nineteen miles N. 30 degrees W. from Double Island Point, Queensland; 33 fathoms. Holotype of *E. iridca*.

Capricorn Group, off Port Curtis, Queensland; 25-30 fathoms. Queensland Museum.



NYCTIMENE TRYONI Longman.

A NEW NYCTIMENE FROM SOUTH QUEENSLAND.

By HEBER A. LONGMAN, F.L.S., DIRECTOR.

(Plate XII.)

THROUGH the kindly interest of Mr. Henry Tryon, Government Entomologist, the Queensland Museum obtained on October 1, 1920, a new species of *Nyctimene* secured by Mr. D. Lahey at Canungra, near the boundary of our National Park in the Macpherson Range, South Queensland.

Two species of *Nyctimene* (*N. papuanus* and *N. robinsoni* from Cape York and Cooktown respectively) have been previously recorded from North Queensland, but the occurrence of this genus south of Brisbane is somewhat surprising. Since the publication of Knud Andersen's masterly Catalogue of the Chiroptera, vol i, by the British Museum authorities in 1912, the determination of our Megachiroptera has been simplified. Fourteen species have been described, the majority being from Papua and the surrounding islands.

The absence of lower incisors, the presence of tubular nasal appendages, yellow spots in the membranes, a dark dorsal stripe, together with the four circumvallate papillæ, form striking and unmistakable generic characteristics.

NYCTIMENE TRYONI n. sp.

Allied to *N. robinsoni* O. Thomas, but readily distinguished by its general larger size, by the smaller and more circular ears, the greater length (chiefly contained in the metacarpal) of the second digit, the longer tibia, the shorter tail, and other features as set out.

Measured in the flesh, the length from head to tail-tip is 105 mm., and the approximate diameter across wings is 200.

General colour above smoke-gray (Ridgway); bases of the hairs gray: a narrow dark spinal stripe is present; hairs about 10 mm. in length; on the ventral surface the prevailing colour is fawn, but the tips of the hairs give a silver-gray effect; the fur on the flanks and to the proximal third of the forelimbs becomes fulvous. The characteristic yellow spots of the genus are sparsely distributed on the membranes, but are not so large as in our specimens of *papuanus* and *geminus*.

The ears are evenly rounded, and the antero-lateral margin is scalloped. The tongue has the typical four circumvallate papillæ, the posterior pair being much closer together than the anterior; reflexed tridentate papillæ are present on the median anterior portion. About 20 ridges are developed on the palate; with the exception of the anterior ridge, the first 14 are convex, 3 are fairly straight, the posterior ridges being undulating. There appear to be no very

remarkable dental or cranial characteristics. As in *N. robinsoni*, the interorbital portions of the frontals are considerably swollen. The posterior edge of the bony palate is subtriangular. No secondary cusps are developed from the cingulum of the upper canines. Posterior heels are well developed in the third and fourth upper and lower premolars, and the usual inner cusp is present on the third. In transverse section the crowns of p^4 and m^1 are subequal. The angular processes of the mandible are prominent outwardly. An angle of 120° to the base line is formed by the coronoid process.

The specimen is fully adult, and there are no signs of the premaxillary sutures.

Measurements.

Forearm	68
Pollex—	
Total length with claw	32
Metacarpal	16
1st phalanx	12
2nd digit—	
Metacarpal	38
1st phalanx	6
2nd-3rd phalanx, with claw	11
3rd digit—	
Metacarpal	50
1st phalanx	37
2nd phalanx	46
4th digit—	
Metacarpal	45
1st phalanx	28
2nd phalanx	30
5th digit—	
Metacarpal	49
1st phalanx	24
2nd phalanx	26
Ear—	
Length from orifice	16
Greatest breadth, flattened	12
Tail	23
Free portion from dorsal surface	13
Tibia	28
Foot, with claw	17
Calcar	9

Cranial and dental:

Skull—

Lambda to gnathion	..	..	..	..	36
Condyllo-basal length	..	..	..	..	34
Palation to incisive foramina	..	..	..	..	15.5
Palation to basion	..	..	..	..	14.5
Rostrum, length orbit to nares	..	..	..	..	7.5
Rostrum, height at alv. of canine	..	..	..	..	8
Width of brain-case at zygomata	..	..	..	..	15
Zygomatic width	..	..	..	..	23
Across crowns of m^1 - m^1 , externally	..	..	..	..	11
Lachrymal width	..	..	..	..	9
Across crowns of canines, externally	..	..	..	..	7
Premaxillæ, depth at symphysis	..	..	..	..	3.5
Postorbital width	..	..	..	..	5.5
Interorbital width	..	..	..	..	6.5
Mesopterygoid fossa, width	..	..	..	..	5.25
Between p^1 - p^1	..	..	..	..	6.5
Between bases of canines	..	..	..	..	2.5
Orbital diameter	..	..	..	..	9.5

Mandible—

Length from condyle	..	..	..	..	25.25
Height at coronoid	..	..	..	..	16.0
Upper teeth, c - m^1 , crowns	..	..	..	..	13.2
Lower teeth, c - m^2 , crowns	..	..	..	..	15

Type in Queensland Museum, Reg. No. *J. 3436*, adult male. Type locality: Canungra, South Queensland.

This latest addition to our non-marsupial mammals is almost certainly descended from early Papuan emigrants, but it has been sufficiently long in the land to become specifically distinct.

A specimen of *N. papuanus* from Cape York in our collections has the forearm 60 mm. in length, being slightly larger than Knud Andersen's maximum. In view of the revision in the latest monograph, Edgar R. Waite's record of "*Uronycteris cephalotes*" (Records Austr. Mus., iv, 1912, p. 144) should probably be attributed to either *N. robinsoni* or *papuanus*.

On COLEOPTERA, mostly from Queensland.

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(Contribution from South Australian Museum.)

(Plate XIII.)

THERE are probably in Queensland more species of beetles than occur in the rest of Australia, and the wealth of life in its coastal districts can be surpassed in but few parts of the world; so far as these are concerned many of the species extend into the "Big Scrub" and Illawarra districts of New South Wales, and in the Far North many New Guinea and Malayan forms occur. Comparatively few districts in Queensland have been well worked for beetles; the Brisbane district (including Mount Tambourine and Moreton Bay islands), Gayndah, Cairns (including Kuranda, Atherton, Malanda, &c.), Rockhampton, Bowen (Port Denison), Cooktown (Endeavour River), Somerset (including Thursday Island), Townsville, and a few other coastal towns have been comparatively well worked, but the islands north of Brisbane and in the Gulf of Carpentaria, and almost the whole of the western districts, have been greatly neglected.

Even in the comparatively well-worked districts the smaller species are often overlooked, the passing collector usually keeping a watchful outlook for large or brilliant species; neglecting the minute forms that must be searched for on sea-beaches, amongst fallen leaves, in moss, associated with ants, and that may be seen in enormous numbers during floods.

Specimens of all the species here described as new are in the collection of the Queensland Museum; many were originally taken by Mr. Henry Hacker, the entomologist of that institution.

FAMILY NITIDULIDÆ.

CYCHRAMUS PICTICOLLIS sp. nov.

Castaneo-flavous, or flavous, some parts more or less deeply infuscated or black. Moderately densely clothed with subdepressed, ashen pubescence.

Head wide; with fairly dense and sharply defined but subasperate punctures; labrum rather feebly bilobed. *Antennæ* with third joint thinner than second, and about once and one-half as long; club large, almost twice as long as wide. *Prothorax* rather strongly and evenly convex, base more than twice as wide as the median length, sides strongly rounded and very finely margined, hind angles rounded off, apex about half the width of base, and rather deeply emarginate; punctures not quite as dense as on prothorax. *Scutellum* large and semicircular. *Elytra*, when at rest, with outlines continuous with those of prothorax, sides feebly diminishing in width from near base, apex widely

rounded; punctures much as on prothorax; nonstriated. Intercoxal process of *prosternum* just passing hind coxæ, its tip truncated; middle coxæ separated slightly more than front ones, and about half the distance of hind ones. *Legs* stout, three basal joints of front and of middle tarsi wide, of the hind ones rather narrow. Length, 3.4-5 mm.

Hab.—Northern Queensland (Blackburn's collection); Brisbane (H. Hacker and C. McGregor). New South Wales: Dorrigo (W. Heron).—Type, *I.* 12058 in South Australian Museum; cotype, *C*/2270 in Queensland Museum.

The markings of the prothorax readily distinguish this species from *C. niger* and all others known to me. The dark parts vary from rather lightly infuscated to deep black; they irregularly cover the head between the eyes and about two-thirds of the prothorax, so that several pale spots are enclosed in front, and the hind margin has four lobes: the elytra vary from entirely pale, or with the sides faintly infuscated, to almost entirely dark, but usually they have a large obscurely pale triangle about the scutellum; the club (except part of the apical joint) and parts of the metasternum are also dark. The dark markings of the head are usually extended so as to leave but two small pale spots at the base; on one Brisbane specimen the prothoracic markings are reduced to three irregular, disconnected, infuscated spots. On many specimens the abdomen is covered by the elytra, on others part of the pygidium is exposed.

CYCHRAMUS INCONSTANS sp. nov.

Colour and clothing variable.

Head with rather dense but partially concealed punctures; clypeal suture shallow and semicircular; labrum deeply notched. Antennæ long and thin, first joint slightly longer than third, and about thrice the length of second, ninth elongate-triangular, apex incurved, tenth shorter than ninth but of the same width and longer and slightly wider than eleventh, sides gently rounded, apex incurved, eleventh subcircular. *Prothorax* at base more than twice as wide as the median length, sides strongly rounded and finely margined, apex gently incurved to middle, and about two-thirds the width of base; punctures as on head. *Scutellum* rather large and semicircular. *Elytra*, when at rest, with sides continuous with those of prothorax, gently decreasing to apex, leaving most of pygidium exposed; punctures dense, partially concealed, and more or less asperate. Intercoxal process of *prosternum* evenly convex, truncated posteriorly. *Legs* stout, three basal joints of front and of middle tarsi wide, of the hind ones less wide. Length, 4.8 mm.

Hab.—Queensland: Cairns (Macleay Museum, H. Hacker and A. M. Lea); Barron Falls (A. Koebele); South Johnstone River (H. W. Brown).—Type, *I.* 12063 in South Australian Museum; cotype, *C*/2271 in Queensland Museum.

The long antennæ with loosely articulated club are at variance with other species of *Cychramus*, but as I am not prepared to propose a new genus for the

reception of the present species it has been referred to that genus. The seven specimens, under examination, appear to belong to but one species, although no two are alike in their size, colour, and markings. The type is 5 mm. in length, of a dull reddish-brown colour, with two elongated dark spots on the pronotum and some vague infuscations on the elytra: it is rather densely clothed with ashen pubescence, becoming denser on the scutellum, and on an apical triangle on the elytra; the triangle commences on the suture just beyond the middle, and is dilated so as to cover the entire apex; it is distinct on all the specimens and accentuated by a dark oblique line on each elytron immediately before it, although on two specimens the dark lines are very faint. The largest specimen is somewhat paler than the type, and has four spots on the prothorax (the lateral ones very feeble) and one on each shoulder, in addition to the postmedian ones; three specimens are darker, with the dark markings on the prothorax ill-defined, and the elytral markings connected so as to appear like a reversed M. The smallest specimen is entirely pale, the oblique lines before the apical triangle being represented by semi-nude spaces that are scarcely perceptibly infuscated. On some specimens the club is hardly darker than the rest of the antennæ. The sides of the prothorax are usually widest almost at the base, but on several of the smaller ones the greatest width is median; the emargination of the apex is an even incurvature, not a three-sided incision as on others of the genus; there are vague remnants of striation on the elytra.

GYMNOCYCHRAMUS nov. gen.

Head wide between eyes; clypeus narrow, hind suture obliterated; labrum rather large, deeply bilobed. Eyes fairly large, lateral, prominent, moderately faceted. Mandibles strong, dentate near apex. Antennæ thin; club large, compact, almost circular, three-jointed. Palpi small, approximate at base. *Prothorax* wide, sides finely margined and strongly rounded. *Scutellum* large, semicircular. *Elytra* covering abdomen except part of pygidium. *Prosternum* in middle about half the length of pronotum, ridged along middle in front, produced as an equilateral triangle behind coxæ, the tip of the triangle marking the summit of an acute ridge; coxal cavities large, transverse, each closed by a narrow strip. *Metasternum* elongate; axillary piece on each side rather wide and traceable, but very narrow, to beyond the middle. *Abdomen* with first segment, along middle, longer than fifth, the others short and equal. *Legs* rather short and stout; femora grooved and edentate; tibiæ with two spines at inner apex, the front ones with a strong spur at outer apex; tarsi with three basal joints, wide and densely clothed on under surface, fourth small, fifth long and thin.

Allied to *Cychramus*, but labrum more conspicuously notched, intercoxal process of prosternum triangular posteriorly, and upper surface polished and glabrous; the notch in the labrum is so deep that, from behind, it appears to extend to the clypeus; there is a groove in front of each eye for the reception of the basal joints of antennæ.

GYMNOCYCHRAMUS POLITUS sp. nov.

Blackish, or dark reddish brown; scutellum, mesosternum, metasternum, abdomen, and antennæ (except club) more or less castaneous. Upper surface glabrous and polished; under surface and appendages sparsely pubescent.

Head across eyes about one-third wider than at base; with fairly dense and sharply defined but small punctures; a deep impression at each side of clypeus; lobes of labrum with a short but distinct fringe. Antennæ with basal joint stout, slightly larger than each lobe of labrum, second small, about half the length of third, and slightly shorter than fourth, ninth and tenth widely triangularly excised at apex, eleventh with its tip slightly produced in middle. *Prothorax* evenly convex, base about twice as wide as the median length, sides strongly rounded and finely margined, apex semicircularly emarginate and about half the width of base, front angles rounded off, hind ones slightly produced and feebly clasping shoulders; towards sides with minute punctures, the middle impunctate or almost so. *Scutellum* impunctate, at base the width of three elytral interstices. *Elytra* at base slightly narrower than prothorax, sides narrowed and finely margined to apex; with rows of distinct but not very large punctures, towards the sides and apex the rows with feeble evidences of striation; interstices with minute punctures. *Abdomen* with a row of punctures at the base of each segment, the apical segment and the pygidium with numerous punctures, slightly coarser than on head. Front tibiæ finely serrated externally, the apical spur slightly curved, and about two-thirds the length of claw-joint. Length, 5.5-6.5 mm.

Hab.—New South Wales: Richmond River, in fungi.—Type, C/2272 in Queensland Museum; cotype, I. 12056 in South Australian Museum.

On several specimens the elytra are deep black, on one the head and prothorax are reddish-castaneous, on all of them the scutellum is the palest part of the upper surface. The flap-like margins of the prothorax, as seen from below, are about twice as wide at the base as at the apex.

CIRCOPES VAGANS sp. nov.

Black; antennæ, palpi, and legs more or less castaneous. Densely clothed with depressed ashen pubescence, on the elytra in numerous closely placed series.

Head with fairly dense, partially concealed punctures. Antennæ short, club almost circular. *Prothorax* evenly convex, base more than twice as wide as the median length, sides strongly rounded and very finely margined, hind angles slightly embracing shoulders, apex moderately emarginate, about half the width of base; punctures much as on head. *Scutellum* rather large and semicircular. *Elytra* at base slightly narrower than prothorax, sides feebly diminishing in width to apex; with numerous regular rows of subasperate punctures, becoming irregular about tip; not covering pygidium. Intercostal process of *prosternum* slightly produced beyond coxæ and obtusely pointed. *Legs* rather short and stout. Length, 2.2-2.5 mm.

Hab..—Northern Queensland (Blackburn's collection); Cairns (F. P. Dodd); Brisbane (H. Hockings); Stradbroke Island (J. H. Boreham and H. J. Carter); Bribie Island (H. Hacker and A. M. Lea). New South Wales: Dorriggo (W. Heron); Sydney (Lea). Northern Territory: Darwin (W. K. Hunt).—Type, *I. 12042* in South Australian Museum; cotype, *C/2273* in Queensland Museum.

Structurally close to *C. adelopiformis*, but derm of upper surface usually entirely dark. The club of the antennæ is usually infuscated, but is often no darker than the other joints; on a few specimens the basal angles of the prothorax are obscurely reddish, and on many parts of the prosternum and the tips of the elytra are also obscurely reddish. There are about twenty lines of pubescence on each elytron.

CIRCOPEUS CASTANEUS sp. nov.

Castaneous; under surface, legs, and antennæ somewhat paler than upper surface. Rather densely clothed with depressed pale pubescence. Length, 1.25-1.5 mm.

Hab..—Northern Queensland (Blackburn's collection); Cairns district (E. Allen, F. P. Dodd, H. Hacker, and A. M. Lea); Dunk Island (F. E. Wilson from C. L. Barratt).—Type, *I. 12043* in South Australian Museum; cotype, *C/2274* in Queensland Museum.

Structurally very close to the preceding species, from which it differs in being paler and much smaller; it is also decidedly smaller and somewhat darker than *C. adelopiformis*. The lines of pubescence on the elytra are as numerous as on the preceding species, but the alternate ones are rather less even.

CARPOPHILUS SUTURALIS sp. nov.

Blackish brown; muzzle, sides of prothorax, scutellum, shoulders, sides, suture, and tips of elytra, under surface, legs, antennæ, and palpi more or less castaneous. Moderately clothed with depressed ashen pubescence.

Head with dense and sharply defined but rather small punctures; a small depression on each side in front. Antennæ short, club almost circular. *Prothorax* about once and one-half as wide as long, sides finely margined, parallel on basal half, evenly rounded in front, apex gently incurved to middle; punctures in middle of apex much as on head, somewhat larger elsewhere. *Scutellum* semicircular; with distinct punctures, except at tip. *Elytra* at base slightly wider than median length, sides almost parallel, tips obliquely narrowed to suture; punctures at base more crowded than on base of prothorax, but no larger, becoming smaller and sparser posteriorly. Dorsal portion of *abdomen* subtriangular, and with dense, sharply defined punctures on the two exposed segments. Length, 3.3-75 mm.

Hab.—Northern Queensland (Blackburn's collection); Bribie Island (H. Hacker and A. M. Lea). New South Wales: Sydney (Lea).—Type, *I. 12049* in South Australian Museum; cotype, *C/2275* in Queensland Museum.

An ordinary-looking species, not as dark as *C. planatus*, slightly more convex and with more sharply defined elytral punctures; larger than *C. dimidiatus*, and differently coloured. Some specimens are of a very dark brown, with the paler parts of the upper surface narrow and rather sharply defined; others are paler, almost uniformly castaneous-brown, with the paler parts less defined.

ÆTHINODES VARIABLE sp. nov.

Colours variable. Moderately clothed with depressed, pale pubescence.

Head with dense punctures between eyes (these prominent), a narrow impressed line at base, and two impressions in front. Antennæ rather short, club briefly elliptic. *Prothorax* slightly more than twice as wide as long, base gently bisinuate and about one-fourth wider than apex, hind angles acute and slightly embracing shoulders, sides somewhat flattened, rather strongly rounded in front, apex gently incurved to middle, with fairly dense subasperate punctures of moderate size, becoming smaller in middle of apex and on sides. *Elytra* with outlines continuous with those of prothorax, sides strongly rounded beyond middle, with fairly deep punctate striae, the punctures larger towards base and striae deeper towards apex; interstices rather narrow, the alternate ones slightly more elevated. Intercostal process of *prosternum* continued beyond coxæ, its tip triangular. *Abdomen* with tip frequently uncovered by elytra; basal segment almost as long as three following combined. Length, 2.2-5 mm.

Hab.—Queensland: Cairns district (E. Allen, F. P. Dodd, H. Hacker, No. 929, and C. J. Wild); Mount Tambourine. New South Wales: Ourimbah, National Park (A. M. Lea).—Type, *I. 12051* in South Australian Museum; cotype, *C/2276* in Queensland Museum.

In general appearance like *A. marmoratum* on a greatly reduced scale, but elytral markings differently placed, and third and fifth interstices not terminated before apex. The colour varies from a pale dingy flavous with paler markings on slightly infuscated elytra, to almost black with sharply defined markings on elytra. The darker form, one of which is the type, is piceous brown: muzzle, sides of prothorax, spots on elytra, antennæ (except club), legs, and parts of under surface more or less flavous; there are often eighteen spots on the elytra so placed as to form an irregular circle about the basal half of the suture, a postmedian fascia (the fascia may be composed of connected or disconnected spots), and a semicircle on each side of base; the most conspicuous spots are on each side of the scutellum, and these form parts of the circle and semicircles; on one almost black specimen, the only spots on the elytra are those adjacent to the scutellum. The pale form has parts of the head, prothorax, and under surface slightly infuscated (sometimes scarcely darker than the adjacent parts); the elytral spots may be disposed as on the dark form, although less sharply defined, or so extended that the basal semicircles are entire instead of

formed of spots, and the postmedian fascia also entire; on one specimen it is widely advanced along the suture so as almost to touch the semicircles; on some of the pale specimens there are also traces of pale subapical spots. On about half of the specimens there are two shallow impressions on the disc of the pronotum, but on others these are not, or scarcely, traceable. The specimens from Mount Tambourine and New South Wales were all sifted from rotting leaves; the specimen from Mr. Dodd was taken from a sticky seed of *Pisonia brunoniana*.

This species is certainly congeneric with *A. marmoratum*, but it is doubtful if the genus *Ethinodes* can be maintained as distinct from *Lasiodactylus*.

FAMILY TROGOSITIDÆ.

PHYCOSECIS HILLI sp. nov.

Black; under surface, legs, and antennæ of a dingy brown. Upper surface with silvery-white adpressed scales, almost evenly plating the prothorax, somewhat thinner and sublineately arranged on elytra; under surface and legs with sparse pubescence or short setæ.

Head wide. *Prothorax* transverse, hind angles widely rounded off, median lobe wide, semicircular, and concealing head from above. *Elytra* sub-ovate, base slightly wider than widest part of prothorax; with large shallow punctures, each containing and almost concealed by a scale. *Legs* thin, but not very long. Length, 2 mm.

Hab.—Queensland: Townsville (G. F. Hill, No. 1054, and A. M. Lea); Cairns (E. Allen).—Type, *I. 11589* in South Australian Museum; cotype, *C/2277* in Queensland Museum.

In size and general appearance close to *P. ammophilus*, but prothoracic scales not quite as dense, and elytral clothing true scales instead of more or less stout setæ. The derm of the elytra is usually black, but on several specimens is a dingy brown. Ten specimens were obtained at the roots of beach-growing plants.

FAMILY SCARABÆIDÆ.

PHYLLOTODIDIUM BIMACULIFLAVUM Lea.

A specimen from Dorrigo (in the Queensland Museum) differs from the type in being flavous with a greenish gloss, the gloss very conspicuous on the head, and on some dark markings on the prothorax and elytra; these consist of four spots on the prothorax—a fairly large one on each side of the middle, and a small one on each side; on each elytron there is a small humeral spot and a transverse mark about the middle; only comparatively small parts of the legs are infuscated. A specimen from Comboyne is even paler, on the prothorax only the lateral spots are present, and on the elytra only the transverse ones.

FAMILY MALACODERMIDÆ.

METRIORRHYNCHUS.

The rostrum long, short, or absent, antennæ serrate, pectinate, or ramose, prothorax three-, four-, five-, or seven-areolate, subsutural costa simple, bifurcate or trifurcate, and elytral punctures in single or double series or irregular, are characters amongst which there are so many intervening ones that probably the names *Achras*, *Cladophorus*, *Metriorrhynchus*, *Stadenus*, *Synchonnus*, *Trichalus*, *Porrostoma*, and *Xylobanus* should be regarded as synonymous, or at the most as representing sections of a genus; but as C. O. Waterhouse and others have regarded some or all of them as valid I do not purpose proposing new specific names for some that have been used more than once; these names (of which at least one of each was for an Australian species) are as follows:—

- | | |
|--|---|
| <i>ampliatus</i> (<i>Trichalus</i>) Waterhouse, 1877. | <i>ater</i> (<i>Xylobanus</i>) Macleay, 1887. |
| <i>ampliatus</i> (<i>Xylobanus</i>) Macleay, 1887. | <i>lineatus</i> (<i>Metriorrhynchus</i>) Hope, 1831. |
| <i>angustulus</i> (<i>Metriorrhynchus</i>) Waterhouse, 1879. | <i>lineatum</i> (<i>Porrostoma</i>) Waterhouse, 1877. |
| <i>angustulus</i> (<i>Trichalus</i>) Macleay, 1887. | <i>longicornis</i> (<i>Cladophorus</i>) Macleay, 1886. |
| <i>apicale</i> (<i>Porrostoma</i>) Waterhouse, 1877. | <i>longicornis</i> (<i>Xylobanus</i>) Macleay, 1887. |
| <i>apicalis</i> (<i>Cladophorus</i>) Macleay, 1886. | <i>serraticornis</i> (<i>Lycus</i>) Fabricius. Syst. Ent. p. 203; transferred by Waterhouse to <i>Trichalus</i> , 1877. |
| <i>apicalis</i> (<i>Trichalus</i>) Macleay, 1886. | <i>serraticornis</i> (<i>Metriorrhynchus</i>) Macleay, 1887. |
| <i>ater</i> (<i>Metriorrhynchus</i>) Waterhouse, 1879. | |

METRIORRHYNCHUS CLIENTULUS Waterh.

Seven specimens from Mount Tambourine, one from Brisbane, and one from the Tweed River agree with the original description and figures of this species, of which only a female was known to Waterhouse, but in his second description the elytra were described as having the apical fifth black, and were so figured. Of the specimens before me three have at least two-fifths black, and one of the others from one-fourth to one-third; as they are certainly conspecific and the markings somewhat variable, it is probable that the type had less of the apex dark than the average. The male differs from the female in having longer antennæ, with the serrations more pronounced, the legs somewhat longer, and in the abdomen.

METRIORRHYNCHUS CÆNOSUS Lea.

Two specimens, from the Queensland National Park, evidently belong to this species, but differ from the types in having the lateral third and rather more than the apical third of each elytron flavous, instead of the margins and tips only.

METRIORRHYNCHUS BASALIS sp. nov.

♂ Black, basal portion of elytra brick-red.

Head with muzzle very short. *Antennæ* moderately long, third to tenth joints moderately wide and somewhat serrated. *Prothorax* small, conspicuously seven-areolate, sides strongly narrowed to middle; front angles rounded off, hind ones produced and acute. *Elytra* thin, slightly dilated posteriorly; with single rows of large quadrangular punctures, doubled on basal fourth or fifth. Length (♂ ♀), 5.5-7.5 mm.

♀ Differs in having the *antennæ* somewhat shorter, wider, and less serrated, and abdomen wider, with the subapical segment not notched.

Hab.—Queensland: Mount Tambourine (H. J. Carter and H. Hacker); Cairns (E. Allen); Atherton and Cedar Creek (Dr. E. Mjoberg).—Type, I. 12267 in South Australian Museum; cotype, C/2278 in Queensland Museum.

The pale portion of the elytra varies (independently of sex) from rather less than one-third to slightly more than half, on seven specimens being about one-third, and on another seven about half. In my table¹ would be placed with *M. meyricki* (from West Australia), which has the black of the elytra continued along the suture to the base, instead of abruptly terminated some distance before it. In general appearance it is like *M. ramosus* (which has the *antennæ* flabellate in the male), *M. simplicicornis*, *M. dichrous*, and *M. clientulus* (which have less than seven prothoracic areolets), and *M. batesi*, *M. togatus*, and *M. brisbanensis* (which have the elytral punctures in double series).

METRIORRHYNCHUS MINOR sp. nov.

♂ Black, elytra brick-red.

Head with muzzle produced to form a short rostrum. *Antennæ* short and very feebly serrated, third joint almost twice as long as wide, the others shorter, but none transverse. *Prothorax* slightly longer than apical width, conspicuously seven-areolate, apex slightly produced in middle, sides rather strongly elevated near base. *Elytra* rather narrow; with single rows of quadrangular punctures, except on basal fourth, where they are doubled, and with rather strongly elevated alternate interstices. Hind *femora* stouter than usual; hind *tibiæ* wide, the apex notched. Length (♂ ♀), 4.6-5 mm.

♀ Differs in having the *antennæ* somewhat shorter and wider, hind legs similar to the middle ones, and abdomen not notched.

Hab.—Queensland: Brisbane in December (H. Hacker). New South Wales: Inverell (H. J. Carter from J. Stevens).—Type, I. 11812 in South Australian Museum; cotype, C/2279 in Queensland Museum.

The part of the head in advance of the eyes is slightly wider than long; the median areolet of the prothorax is produced so that the carina connecting

¹ Lea, Trans. Ent. Soc. Lond., 1909, p. 51.

it with the apex is about two-thirds the length of the other carinæ connected with it; the hind tibiæ of the male are decidedly wider than the others; from some directions they appear to be widest in middle and narrowed to apex, but from others the apex itself is seen to be dilated and notched; the antennæ differ but little sexually. In general appearance like *M. rhipidius* in miniature; the colours are much as in *M. uniseriatus*, with which it would be associated in my table, but distinguished from that species by the very different antennæ, longer (although short) rostrum, irregular punctures at base of elytra, and irregularly elevated costæ, &c. There are nineteen specimens from Brisbane before me and eleven from Inverell.

METRIORRHYNCHUS TRICAVICOLLIS sp. nov.

♀ Flavous-red; part of head, antennæ, palpi, apical two-fifths of elytra, and abdomen black; tarsi and tips of tibiæ infuscated.

Head with very short muzzle. Antennæ rather short, slightly serrated, thicker and more densely pubescent than usual, second joint minute, third much longer than first and distinctly longer than fourth, the others gradually decreasing in width, tenth slightly longer than ninth, and distinctly shorter than eleventh. *Prothorax* strongly transverse, all margins thickened and strongly elevated (the base less strongly than the others), triareolate, the median areolet connected with base and apex, and unusually wide (about one-third the width of prothorax near its apex); front angles rounded off, hind ones produced and acute. *Elytra* moderately wide; with single rows of large transversely oblong punctures, near base feebly doubled. Length, 5 mm.

Hab.—Queensland: Cairns (A. P. Dodd); Blackall Range in April (C. J. Wild).—Type, C/2280 in Queensland Museum.

A curious velvety species, very different from any other species before me; in my table it would be associated with *M. basiflavus*, but the prothorax is more transverse, with the median areolet very different, legs paler, &c. Each elytron almost throughout has but five series of punctures, as the doubling of the rows near the base is but faint, the punctures about the apex are irregular, and near the apex the outer row is feebly doubled.

METRIORRHYNCHUS FLAVOLIMBATUS sp. nov.

♂ Black; sides of prothorax rather widely, and much of elytra pale.

Head with muzzle very short. Antennæ rather long, third to tenth joints moderately serrated, third longer than fourth, eleventh slightly longer than tenth. *Prothorax* moderately transverse, seven-areolate, front obtusely produced in middle, sides strongly elevated and narrowed to middle; front angles rounded off, hind ones produced and sharply acute. *Elytra* slightly dilated posteriorly; with double rows of irregular punctures, alternate interstices distinctly elevated. Length (♂ ♀), 6-11 mm.

♀ Differs in having somewhat shorter and less strongly serrated antennæ, and abdomen not notched.

Hab.—Queensland: Mount Tambourine (H. Hacker, Dr. A. R. Pulleine, and Dr. E. Mjöberg); Killarney (Hacker). New South Wales (J. A. Kershaw); Illawarra (H. W. Cox); Woolgoolga (H. J. Carter).—Type, *I. 12268* in South Australian Museum; cotype, *C/2281* in Queensland Museum.

In general appearance close to *M. limbatus*, but the median areolet of the prothorax shorter, and the costæ connected with it differently placed; from each side of the areolet at its widest part a costa extends only halfway to the front margin (instead of towards each side as in *limbatus*); a feeble ridge (hardly a costa) extends across part of the middle from the areolet, so that although seven areolets are indicated only the median one is completely isolated. The extent of black on the elytra varies considerably, but the sides, tips, and part of the suture are pale on all the specimens (eleven) before me; on only one of them the suture is pale to the base; the second stout costa on most of them is pale throughout, for most of its extent it traverses black surface, but near the base and apex the parts traversed are flavous.

METRIORRHYNCHUS QUINQUECAVUS sp. nov.

♂ Black, elytra and sides of prothorax brick-red.

Head with muzzle very short. Antennæ rather long, moderately serrated, third joint slightly longer than fourth, and eleventh slightly longer than tenth. *Prothorax* moderately transverse, five-areolate, median areolet continuous from base to apex, at its widest part a carina connecting it with each side, latero-basal areolets about one-third larger than the latero-apical ones; front angles rounded off, hind ones produced and sharply acute. *Elytra* very little wider near apex than at base; punctures irregular. Length, 7 mm.

Hab.—Queensland: National Park (H. Hacker).—Type, *C/2282* in Queensland Museum.

On each elytron of the type there is a small black stain near the suture, about one-third from apex. The elytral punctures in places are almost in single series, but many of them are like Y's transversely placed; at the basal fourth they are distinctly in double rows, but elsewhere the rows are usually feebly doubled, so that they could not fairly be regarded as being in single series. In general appearance the species resembles *M. lateralis* and *M. irregularis*, but distinguished by the five-areolate prothorax; in *M. flavolimbatus* the central areolet has short spurs, denoting the partial presence of seven areolets, but on this species these are entirely absent.

METRIORRHYNCHUS FRATER sp. nov.

♂ Black, basal three-fourths of elytra brick-red.

Head with long and rather thin rostrum. Antennæ rather long, moderately wide and strongly serrated. *Prothorax* moderately transverse,

sharply seven-areolate, apex produced in middle and truncated, sides strongly elevated, angularly narrowed to middle; front angles rounded off, hind ones produced and acute. *Elytra* almost parallel-sided; with regular double rows of punctures, the alternate interstices elevated. Hind *tibia* somewhat thickened in middle, lower edge bisinuate, apex thickened and notched. Length (δ ♀), 10-12 mm.

♀ Differs in having shorter and less strongly serrated antennæ, hind tibiæ not so wide, the apex not thickened, and abdomen not notched.

Hab.—Queensland: Mount Tambourine in November and National Park in December (H. Hacker).—Type, *C/2283* in Queensland Museum; cotype, *I. 12269* in South Australian Museum.

There are many other species of the allied genera having the prothorax and apex of elytra black, but this is the only known one in which the rostrum is long, its length being about two-thirds that of the prothorax; in my table it would be placed with *M. disconiger*, but the black of the elytra is confined to the apex. The hind tibiæ of the male are dilated to the apex as viewed from behind, but they seem to be narrowed there from some directions.

METRIORRHYNCHUS CRYPTOLEUCUS sp. nov.

♂ Black, elytra and sides of prothorax brick-red.

Head with rostrum rather long and moderately wide. Antennæ rather long, strongly serrated, third joint stouter and slightly longer than fourth, eleventh conspicuously longer than tenth. *Prothorax* moderately transverse, distinctly seven-areolate, front somewhat rounded in middle, front angles widely rounded off, sides feebly increasing in width and height to base, but hind angles projecting outwards. *Elytra* almost parallel-sided; with regular double rows of transversely oblong punctures, the odd interstices regularly elevated. Subapical segment of *abdomen* with a wide median notch almost to base. Hind *tibiæ* somewhat thickened. Length (δ ♀), 14-20 mm.

♀ Differs in having antennæ shorter and less strongly serrated, subapical segment of abdomen not notched, the apical one with a slight median notch at apex, on each side of which is a small elevation, and hind tibiæ thinner.

Hab.—Queensland (National Museum): Mount Tambourine (Dr. E. Mjöberg and A. M. Lea); National Park and Mapleton in November (H. Hacker). New South Wales: Acacia Creek (H. J. Carter).—Type, *I. 12270* in South Australian Museum; cotype, *C/2284* in Queensland Museum.

A rather large species, in some respects close to *M. variipennis*, and elytra sometimes partly dark (on twelve specimens entirely pale), but rostrum somewhat shorter, and sides of prothorax not angularly dilated near base; from above the margins of the prothorax appear to be gently and evenly (except for a feeble sinuation) dilated to the base, from the sides they appear to be gently and evenly convex; but on that species the margins, from all points of view, are seen to be suddenly and angularly dilated near the base. On most of the specimens the

sixth and seventh segments of the abdomen, or sometimes only the sixth, have a small waxy-white strip on each side. The rostrum is more than half the length of the prothorax and its upper surface is about twice as long as wide, but the lower surface is dilated at the base. In my table would be placed with *M. lateralis*, from which they differ in being larger and in having the rostrum and antennæ decidedly shorter.

Var.—Four specimens from New South Wales (Dorrigo, W. Heron; and Illawarra, H. W. Cox) have the elytra black, with the sides, apex, and suture pale; the pale parts are somewhat dilated on the shoulders, and continued for a short distance along some of the costæ; about one-fourth or one-fifth of the tips are pale. The size ranges 10-17 mm. and the under parts are as on the typical form. In my table the variety would be associated with *M. variipennis*, from which it differs structurally as the types.

METRIORRHYNCHUS DENTIPES sp. nov.

♂ Black and flavous, inclining to brick-red.

Head with rostrum of moderate length (about as long as its basal width). Antennæ rather long, most of the joints strongly serrated, second minute, third to fifth with some long straggling hairs on under surface, third about twice as long as wide, its tip slightly produced on one side of apex, fourth distinctly shorter than third, and scarcely longer than fifth, their tips more distinctly produced than on third, sixth to tenth with serrations commencing at base. *Prothorax* along middle about as long as greatest width, conspicuously seven-areolate; apex subtriangularly produced in middle, sides subparallel to middle, then dilated to base, hind angles subacute. *Elytra* with regular double rows of punctures, the alternate interstices elevated. *Tibiæ* wide, the hind ones each with a large obtuse tooth about one-third from apex, and a large truncated process on the inner side. Length (♂ ♀), 8-10 mm.

♀ Differs in having antennæ with shorter and less strongly serrated joints, the subbasal ones without special clothing, abdomen not notched, and hind tibiæ unarmed.

Hab.—Queensland: Coen River (W. D. Dodd).—Type, I. 11822 in South Australian Museum; cotype, C/2285 in Queensland Museum.

The pale parts are the prothorax, scutellum, elytra (except from about one-fourth to about one-seventh of the tips), parts of front and of middle legs (on some specimens the only parts of these that are dark are the tarsi, on others the tibiæ and part of the femora are dark, on some more of the middle than of the front legs are dark), and parts of under surface of from three to five basal joints of antennæ; on three males and two females most of the head is pale, on seven other males it is entirely dark. The rostrum is the exact length of that of *M. rufirostris*, noted in my table as of "moderate" length, but the female differs from the female of that species (the only sex at present known) in having the elytra tipped with black, and more of the legs pale; regarding the rostrum

as long, the species would be associated with *M. abdominalis*, whose male has very different hind tibiae; regarding it as short, with *M. fallax*, whose rostrum is distinctly shorter, legs darker and less of elytra black; at first glance it resembles *M. apicalis*, *M. abdominalis*, and *M. melaspis*; it is, however, distinct from all species of the genus, except *M. tibialis*, by the peculiar hind tibiae; from *tibialis* itself it is distinct by the larger size, longer rostrum (about twice its length), longer antennae (of different colour, clothing, and proportions), prothorax and scutellum entirely pale, and more of legs and of elytra pale; the dark part of the elytra is narrowest at the suture, instead of widest there; the projection itself is also somewhat different from that of *tibialis*—it can be partially received into an excavation near the base of the hind femora. The outer walls of the latero-posterior areolets are considerably higher than the others.

METRIORRHYNCHUS FLAVIPENNIS sp. nov.

♂ Black, elytra flavous.

Head without distinct rostrum. Antennae rather long, third to tenth joints feebly serrated (eleventh missing); third slightly longer than fourth, the following ones gradually decreasing in width, but not in length. *Prothorax* moderately transverse: conspicuously seven-areolate; apex slightly produced in middle, sides dilated from middle to base, front angles obtuse, hind ones produced and acute. *Scutellum* with tips produced. *Elytra* thin, almost parallel-sided; each with ten regular rows of punctures, becoming irregular at base and tips. Length, 7 mm.

Hab.—Queensland: National Park in November (H. Hacker).—Type (unique), C/2286 in Queensland Museum.

A narrow species, at first glance apparently belonging to one of the forms of *M. rufipennis*, with which it would be associated in my table, but the antennae very feebly serrated (much less strongly than even on the female of that species), and punctures, owing to the non-elevation of the alternate interstices, in ten regular rows on each elytron, instead of in five double rows.

METRIORRHYNCHUS MEDIONIGER sp. nov.

♂ Black, sides of prothorax and most of elytra brick-red.

Head with rostrum very short. Antennae moderately long, rather wide and rather strongly serrated, but without a tendency to pectination. *Prothorax* about as long as wide; conspicuously seven-areolate; apex obtusely produced in middle, sides feebly dilated to base, front angles widely rounded off, hind ones almost rectangular. *Elytra* feebly dilated posteriorly; with regular double rows of punctures, the alternate interstices elevated. Length (♂ ♀), 8-10 mm.

♀ Differs in having antennae somewhat shorter and slightly less serrated, abdomen wider, subapical segment not notched, and legs somewhat shorter.

Hab.—Queensland: National Park in October (H. Hacker).—Type, C/2287 in Queensland Museum; cotype, I. 12266 in South Australian Museum.

The prothorax is about as long as wide in the male, but slightly transverse in the female: in my table, therefore, it could not be associated with any of the species of *EEE*, but it is a rather shorter and more compact one than any of those there noted, and the dark part of the elytra is confined to the scutellar region: on each elytron it extends across three rows of punctures at the base, and across two where it terminates at the basal third; in general appearance it is like some small forms of *M. variipennis*, and of *Trichalus ampliatus*. Parts of the head, and on one male parts of three basal joints of antennæ, are obscurely diluted with red.

METRIORRHYNCHUS APICIVARIUS sp. nov.

♂ Prothorax, scutellum, and elytra (except extreme tips) brick-red, elsewhere black.

Head with very short rostrum. *Antennæ* with third to tenth joints ramose, and clothed with distinct hairs. *Prothorax* moderately transverse; conspicuously seven-areolate; front obtusely produced in middle, front angles widely obtuse, hind ones almost rectangular, base very little wider than apex. *Elytra* thin; with regular double rows of punctures, alternate interstices slightly elevated. Length (♂ ♀), 8-10 mm.

♀ Differs in having shorter and strongly serrated antennæ, and subapical segment of abdomen not notched.

Hab.—Northern Queensland (H. J. Carter from H. Hacker); Cairns (E. Allen, A. P. Dodd, and Hacker); Gordonvale in July (E. Jarvis).—Type, *I. 12275* in South Australian Museum; cotype, *C/2288* in Queensland Museum.

The ramus of the third joint is more than twice as long as its support, on some of the others it is almost four times as long as its support; the eleventh joint is more than twice as long as the non-ramose portion of the tenth. Three males and one female have the elytra as described, but on two males the elytra are entirely red; these two also have the central areolet deeply infuscated (almost black); one of the males with black tips has the mesosternum, trochanters, and front and middle coxæ flavous. From *M. trichocerus* (which has very similar antennæ) it differs in being more brick-red than flavous, and the elytra entirely pale or with only the extreme tips dark. The difference in the tips of the elytra would distribute the specimens in my table as follows:—Those with the tips black with *M. gracilis*, from the description of which they differ in having much longer antennal rami, all of these being much longer than their supporting joints; those with the elytra entirely pale with *M. miniatus*, from which they differ in having the central areolet much shorter, and the rami much longer.

TRICHALUS GRIFFITHI Lea.

On specimens of this species the black apical portion of the elytra varies from one-sixth to more than one-third in length.

SUBFAMILY LAMPYRIDES.

The fireflies of Australia, on the whole, have not been carefully collected, and of many of the species only males are known; with some species the female is much like the male, except on the under surface; on the female of *Atyphella scintillans* there are no flight wings, and the elytra are greatly abbreviated, and in Queensland there is at least one species with a larva-like female.¹ The species are as follows:—

Both Sexes Known.

<i>Atyphella lychnus</i> Oll.	<i>L. humilis</i> Oliv.
<i>A. scintillans</i> Oll. (<i>decora</i> Oliv.).	<i>L. platygaster</i> Lea.
<i>Luciola complicata</i> Lea.	<i>L. pudica</i> Oll.
<i>L. flavicollis</i> Mael. (<i>coarcticollis</i> Oliv., <i>gestroi</i> Oliv.).	

Male only Known.

<i>A. atra</i> Lea.	<i>L. cowleyi</i> Blackb. (abundant).
<i>A. brevis</i> Lea (abundant)	<i>L. dejeani</i> Gemm. (<i>apicalis</i> Boi.)
<i>A. flammans</i> Oll.	<i>L. inconspicua</i> Lea.
<i>A. olivieri</i> Lea (abundant).	<i>L. majuscula</i> Lea.
<i>L. costata</i> Lea.	

Not Identified in Australian Collections.

L. australis Fab. (*guerini* Cast., *nigripennis* Latr.).

LUCIOLA INCONSPICUA sp. nov.

♂ Of a dingy brown; head and three basal segments of abdomen black, prothorax (one large and some smaller spots excepted), scutellum, and parts of legs of a rather dingy flavous, two apical segments of abdomen white.

Head largely concave and with numerous punctures between eyes. Antennæ with third joint slightly shorter than fourth, and slightly shorter and thinner than second. *Prothorax* about twice as wide as long, apex obtusely produced in middle, a large depression on each side, smaller ones in middle of base, median line distinct; punctures crowded and in places subasperate. *Elytra* parallel-sided to near apex, each with two distinct discal costæ, thickened much like the suture but becoming thinner posteriorly; punctures crowded and somewhat smaller than on prothorax. Length, 5-6 mm.

Hab.—Queensland: Cairns district (E. Allen).—Type, *I. 11845* in South Australian Museum; cotype, *C/2289* in Queensland Museum.

Mr. Allen obtained twenty-eight specimens, all males; at first glance they look close to *L. cowleyi*, but differ in being slightly narrower, prothoracic markings as an isolated spot no wider than the interocular space, and usually narrower, a minute spot on each side, and two or four minute ones at the base; basal segments of abdomen black, and the two apical segments white on both surfaces.

¹Mr. E. Allen sent two specimens of it from Cairns. They are much like small females of the European *Lampyrus noctiluca*, but as its male is unknown I have not named it.

The elevated parts of the elytra are usually slightly paler than the adjacent surface. The species might almost as well have been referred to *Atypheila* as to *Luciola*; in fact, the phosphorescent portion of its abdomen is exactly as in *A. lychnus*.

ATYPHELLA ATRA sp. nov.

♂ Black; margins of prothorax, and an oblique line on each side of and connected with the base, scutellum, and greater portion of legs of a dingy flavous; two apical segments of abdomen white.

Head almost entirely concealed from above; deeply concave, highly polished and with small punctures between eyes. Antennæ with third joint thinner and slightly longer than second and fourth, sixth to tenth slightly transverse. *Prothorax* about thrice as wide as long, sides strongly rounded and increasing in width to base; surface uneven and with fairly large, shallow, crowded punctures. *Elytra* rather wide, sides feebly dilated, each with three discal costæ, of which the two inner ones are long and almost as stout as the sutural thickening, the other is finer, submarginal, almost as distant from the second as the second is from the suture, commences near the shoulder (this considerably thickened and slightly paler than the adjacent surface), and terminates before the others; punctures dense, sharply defined and somewhat smaller than on prothorax. *Abdomen* with first white segment slightly more than half the length of the preceding one, the following segment considerably longer, with its tip produced in middle. *Legs* thin, but rather short. Length, 6.5-7 mm.

Hab.—Queensland: National Park in November (H. Hacker).—Type, C/2290 in Queensland Museum; cotype, I. 12282 in South Australian Museum.

The interocular space and the abdomen (except the two apical segments) are of an intense black, the other black parts have a more or less brownish tinge; the pale margins of the prothorax are very distinct, at the base from each side the elevated part curves round and is directed obliquely inwards for a short distance, but the base between has also a pale marginal strip. Structurally it is close to *A. brevis* and *A. olivieri*; Mr. Hacker obtained twelve specimens, all males.

ATYPHELLA SCINTILLANS Oll.

Mr. H. J. Carter sent for examination a pair of this species, taken *in cop.* on Bunya Mountain. The female is almost entirely pale (the antennæ and elytra are slightly infuscated only), the abdomen has a mottled appearance, as if the phosphorescent material had been irregularly scattered through it (but no doubt would look different on living specimens). The prothorax is slightly larger than on the male, and has the sides and apex conjoined to form an almost perfect semicircle, but the base is somewhat sinuous, the elytra (each of which has two discal costæ) are very short, being less than their combined width; they leave six abdominal segments exposed and most of the preceding one.

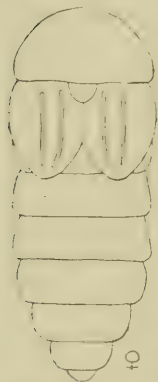


FIG. 1.—*Atypheila scintillans* Oll.

TELEPHORUS VARIIVENTRIS sp. nov.

♂ Flavous; antennæ, palpi, most of elytra, knees, tibiæ, and tarsi black. Densely clothed with short pubescence, golden on the pale parts, blackish on the dark parts.

Head rather wide; with minute punctures. *Antennæ* rather long, moderately stout, joints after the fourth slightly decreasing in width, and slightly increasing in length. *Prothorax* strongly transverse, disc uneven; with very minute punctures. *Elytra* rather long, almost parallel-sided; with crowded rugose punctures, smaller about base than elsewhere, and with remnants of feeble costæ. Apical segment of *abdomen* deeply notched. *Legs* moderately long. Length (♂ ♀), 7.5-10 mm.

♀ Differs in having the head smaller, with shorter antennæ, rather more of the elytra pale, metasternum and abdomen (except apical segment, which is not notched) black or infuscated, and more of femora dark.

Hab.—Queensland: South Johnstone River (H. W. Brown); Malanda (Dr. E. Mjöberg).—Type, *I. 12207* in South Australian Museum; cotype, *C/2291* in Queensland Museum; others in Stockholm Museum.

In my table² would be associated with *T. rubriceps* and *T. rufiventris*; the many species allied to *T. mastersi* differ from it as follows:—*T. mastersi* and *T. froggatti* have base of elytra and part of head black or blackish; *T. mossmani* and *T. macrops* have elytra entirely pale; *T. palmerstoni* has thicker and shorter antennæ, and base of elytra dark; *T. rufiventris* has much less of elytra dark; and *T. rubriceps* has basal joint of antennæ distinctive in the male. On the male the base of the elytra, for a distance about equal to the length of the prothorax, is pale, but the sides are narrowly pale almost to the middle, or even beyond it, and the suture is very narrowly pale also for a short distance.

TELEPHORUS ATRICORNIS sp. nov.

♂ Black and flavous. With rather sparse, ashen pubescence, and fairly numerous, suberect, dark hairs.

Head wide and gently convex between eyes, strongly narrowed to base; with dense minute punctures. *Antennæ* moderately long, fairly stout, but becoming rather thin towards apex, third joint about half the length of fourth. *Prothorax* slightly longer than wide, disc somewhat uneven, sides and suture thickened. *Elytra* long, thin, and parallel-sided to near apex, sides and suture thickened, a fairly distinct discal costa to beyond the middle; with crowded, rugose punctures. *Legs* rather long and thin. Length (♀ ♂), 7-13 mm.

♀ Differs in being rather more robust, head narrower across eyes and wider at base, much less of muzzle pale, and legs slightly shorter.

Hab.—Queensland: Mount Tambourine (A. M. Lea). New South Wales (H. J. Carter); Dorrigo (W. Heron); Tweed River (R. Helms).—Type, *I. 9240* in South Australian Museum; cotype, *C/2292* in Queensland Museum.

² Lea, Trans. Ent. Soc. Lond., 1909, p. 113.

At first glance apparently belonging to *T. imperialis*, with which it would be associated in my table, but antennæ decidedly shorter, thicker, and hairier, the ninth and tenth joints no paler than the adjacent ones, apical joint of palpi smaller, prothorax longer, elytra with a distinct costa on each, and the black part at the base rounded posteriorly, instead of truncated. There are numerous specimens of both species before me, and the differences noted are constant. On both species the antennæ are slightly thicker on the male than on the female. On the male the flavous parts are much of the muzzle, a narrow space at apex of prothorax, and more of its base (the basal portion advanced on the sides), elytra (except for a small space at base and another at apex), parts of sterna, much of under surface of abdomen, trochanters, and parts of coxæ. On the male the extreme base of the head is about half the width across the eyes, on the female it is about two-thirds.

HETEROMASTIX PUSILLUS Boh.

Five specimens from Mount Tambourine, and one from the Queensland National Park, probably represent another variety of this species; they differ from Sydney (the type locality) ones, in being smaller (2.2-75 mm.), and in having the legs flavous, except that the femora on most of them are partly infuscated. Another, from Brisbane, in the Queensland Museum, measuring 2 mm., has much of the prothorax infuscated.

HETEROMASTIX PALLIPES Lea.

A specimen from the National Park, in the Queensland Museum, appears to belong to this species, but is slightly larger (4 mm.) than the type, the apical joint of its antennæ is slightly stouter, and the two basal joints are dark on the upper surface.

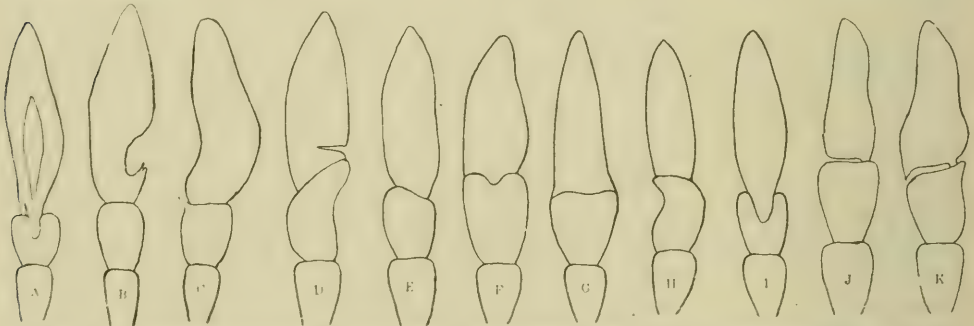


FIG. 2.—Tips of antennæ of species of *Heteromastix*. A, B, C, *spinicornis* Lea; D, E, *melanocephalus* Lea; F, G, *castor* Lea; H, I, *pollex* Lea; J, K, *scutellaris* Lea.

HETEROMASTIX SPINICORNIS sp. nov.

♂ Black, basal two-thirds of elytra flavous. Densely clothed with dark pubescence, becoming golden on pale portion of elytra.

Head with dense and minute punctures. Antennæ moderately long, first

joint scarcely longer than third and at apex no wider, second about half the length of third, third-ninth subequal in length and apical width, tenth distinctly wider and with a small spine at inner apex, eleventh longer than ninth and tenth combined, base irregularly compressed. *Prothorax* more than twice as wide as long, distinctly margined throughout. *Elytra* parallel-sided to near apex; with crowded and small rugulose punctures, and vague remnants of costae. Length, 6.5 mm.

Hab.—Queensland: Mount Tambourine (H. J. Carter).—Type, *I. 11861* in South Australian Museum.

In my table would be associated with *H. luridicollis*, but distinguished from that, as from all other species having the apical joints of antennae distorted, by the black prothorax and bicolorous elytra. The eleventh joint of antennae appears to alter in shape with the point of view; from one direction it appears to have a subbasal notch and to be narrower than the tenth joint; on its under surface it has a short longitudinal groove which appears to be continued on to the tenth; the spine on the latter joint, although small, is quite distinct from above.

Var.—Another male, from Mount Tambourine (taken by Mr. Hacker and in the Queensland Museum), has the prothorax entirely pale, the black part of its elytra is slightly advanced near the suture, and decreased towards the sides; as a result it appears to have an almost circular outline. A female (taken by Mr. Carter), also with flavous prothorax, differs from the male in the usual particulars of antennae, legs, and abdomen.

HETEROMASTIX MELANOCEPHALUS sp. nov.

♂ Black; prothorax, basal two-thirds of elytra, tibiae, parts of femora and of tarsi, and three basal joints of antennae flavous. With moderately dense pubescence, varying in colour with the derm.

Head gently convex between eyes (these rather small and prominent), slightly depressed in front. Antennae moderately long, second joint very short, tenth and eleventh distorted. *Prothorax* almost twice as wide as long, margined throughout, the lateral margins somewhat thickened near apex. *Elytra* almost parallel-sided to near apex; with dense and small, rugulose punctures. Length (♂ ♀), 4.4-5 mm.

♀ Differs in having the head smaller with shorter and somewhat thinner antennae, tenth joint similar to the ninth, and their combined length slightly less than the eleventh, only about one-fourth of the elytra black, legs somewhat shorter, and abdomen not notched.

Hab.—Queensland: Bribie Island in August (H. Hacker and A. M. Lea).—Type, *I. 11862* in South Australian Museum; cotype, *C/2293* in Queensland Museum.

In my table would be placed with *H. luridicollis*, from the description of which it differs in being smaller, head entirely black, legs not entirely pale, and

in the bright flavous colour of its elytra, of which less of their tips are black. The tenth joint of the antennæ of the male is slightly longer than the ninth, and more produced on one side (and curved on it) than on the other; the eleventh is about as long as the ninth and tenth combined, closely applied to the latter and with a narrow notch on one side near the base, the notch invisible from most directions. Mr. Hacker and I obtained eleven specimens, but only one male.

HETEROMASTIX CASTOR sp. nov.

♂ Black; prothorax, parts of under surface of head, two basal joints of antennæ, tibiæ, and parts of femora flavous; tarsi and part of second joint of antennæ infuscated. With short, ashen pubescence.

Head with a shallow interocular depression. Antennæ rather long and not very thin, tenth and eleventh joints closely applied together. *Prothorax* about twice as wide as long, sides slightly dilated near apex, but scarcely thickened. *Elytra* almost parallel-sided to near apex; with dense and small subrugulose punctures. Length, 3.75-4 mm.

Hab.—Queensland: Brisbane (H. Hacker); Glen Lamington (Dr. E. Mjöberg).—Type, C/2294 in Queensland Museum.

The tenth and eleventh joints are somewhat distorted but they are so closely applied together that from some directions they appear to be simple; the tenth, however, has a slight apical notch, in which is received a basal process from the eleventh; it is wider than the ninth, slightly longer on one side, and more noticeably on the other; the eleventh is somewhat dilated at the base, and the process received into the tip of the tenth may be regarded as a remnant of a spine; its longest side is about twice the length of the tenth. So little of the muzzle is pale (scarcely more than the labrum) that the species might be regarded as belonging to *ec* of my table,³ and there associated with *H. gagaticeps*, which has the apical joints very different; but, regarding the muzzle as pale, it would be associated with *H. imitator*, which is a smaller and more fragile species, with thinner antennæ, the eleventh joint of which is much thinner than the tenth.

HETEROMASTIX POLLUX sp. nov.

♂ Black; prothorax, two basal joints of antennæ, and knees flavous. With short pubescence.

Head with two faint interocular impressions. Antennæ rather long and not very thin, two apical joints somewhat distorted. *Prothorax* and *elytra* as described in preceding species. Length (♂ ♀), 3.5-4 mm.

♀ Differs in having the head smaller, antennæ shorter, thinner, and simple, and abdomen not notched.

Hab.—Queensland: Brisbane (H. Hacker). Type, C/2295 in Queensland Museum; cotype, I. 12260 in South Australian Museum.

³ Lea, Trans. Ent. Soc. Lond., 1909, p. 130.

The black scutellum associates this species in my table with *H. gagaticeps*, which is a larger species, with two apical joints of antennæ somewhat different: to the preceding species it is closer, but the tenth joint of antennæ is different, and the knees are the only pale parts of the legs; the following species has the scutellum and middle tibiæ pale, and the apical joints are not quite the same. The tenth joint on one side is distinctly incurved, with its tip slightly produced beyond the base of the eleventh; on one side it is partly excavated for the reception of the base of that joint; the eleventh is slightly wider than the tenth, but from some directions appears to be of the same width.

HETEROMASTIX MINOR sp. nov.

♂ Black; prothorax, scutellum, mesosternum, legs (tarsi slightly infuscated), and two basal joints of antennæ flavous. With short, ashen pubescence.

Head with a shallow interocular impression. Antennæ not very long, two apical joints somewhat distorted. *Prothorax* and *elytra* as described in *H. castor*. Length, 3 mm.

Hab.—Queensland: Buderim Mountain (H. Hacker).—Type (unique), C/2296 in Queensland Museum.

The eleventh joint of the antennæ is slightly longer than in *H. decipiens*, and is not quite simple; the tenth is much shorter, but at first glance the type appears to be a small specimen of that species. It is slightly smaller and with antennæ somewhat similar to those of *H. castor* and *H. pollux*, but the scutellum is pale; this character would associate the species, in my table, with *H. pallipes*, which has much longer antennæ, with the terminal joints different. The tenth joint is somewhat similar to the ninth, but is slightly wider at apex, and a little lopsided; the eleventh also is lopsided and somewhat dilated at base, but the two joints are so closely applied together that it is difficult to see their junctional parts.

HETEROMASTIX SCUTELLARIS sp. nov.

♂ Black; prothorax, scutellum, mentum, mesosternum, legs (tarsi infuscated), and under surface of three basal joints of antennæ flavous. With very short pubescence.

Head with two faint longitudinal impressions in front, terminating posteriorly in two faint interocular ones. Antennæ long, two apical joints distorted. *Prothorax* and *elytra* as described in *H. castor*. Length (♂ ♀), 3.75-4.5 mm.

♀ Differs in having the head smaller, with shorter and simple antennæ, and abdomen not notched.

Hab.—Queensland: Mount Tambourine (A. M. Lea).—Type, I. 11867 in South Australian Museum; cotype, C/2297 in Queensland Museum.

The tenth joint of the antennæ of the male is about the length of the ninth, but longer on one side than on the other; the eleventh is constricted

somewhat nearer the base than apex, and one side of the base is produced into a short spine on to the shorter side of the tenth; the two joints, however, are so closely applied together that it is difficult to see their junctional parts. In my table would be associated with *H. pallipes*, but from the position in which the basal spine of the eleventh joint is visible, on that species, the apical portion of the joint seems set at a tangent, very different from that of the present species: *H. frater* has a pale scutellum, but its muzzle is also pale; *H. minor* is more fragile, with thinner antennæ, of which the two basal joints are entirely pale; *H. major* is a larger species, with legs mostly dark; *H. castor* has the scutellum black, legs mostly black, and two basal joints of antennæ entirely pale; all these species also differ, *inter se*, in the eleventh joint of antennæ.

HETEROMASTIX TIBIALIS sp. nov.

♂ Black and flavous. With rather dense, suberect pubescence.

Head rather large, with a shallow interocular depression. Eyes large and prominent. Antennæ long and thin, ninth joint slightly longer than tenth, and shorter than eleventh. *Prothorax* about twice as wide as long, margined throughout; with distinct, submarginal punctures. *Elytra* almost parallel-sided to near apex; with dense and sharply defined punctures of moderate size, becoming very small on tips. Front *tibiæ* dilated to apex and notched there, basal joint of front tarsi strongly incurved on one side. Length (♂♀), 5.5-5 mm.

♀ Differs in having the head smaller, with smaller and less prominent eyes, antennæ shorter, subapical segment of abdomen not notched in middle, front tarsi only slightly thickened at apex and not notched, and basal joint of front tarsi symmetrical.

Hab.—New South Wales: Dorrigo (W. Heron); Tweed River (A. M. Lea).—Type, I. 11870 in South Australian Museum; cotype, C/2298 in Queensland Museum.

The black parts are the head (except part of its under surface), antennæ, palpi, metasternum, and abdomen; the apical sixth of elytra, apical half of tibiæ, and the tarsi, are more or less deeply infuscated or blackish. In the male the antennæ almost extend to the tips of the elytra; the notch, at the tip of its front tibiæ, has proceeding backwards from it a narrow groove on each side to about the apical third (as if the tibia had been split), the tibia itself is somewhat produced on one side of apex. The general appearance is somewhat as in some forms of *H. luridicollis*, but the antennæ of both sexes are simple.

A male from Queensland (Gympie) appears to belong to this species, but has the flavous parts brighter, almost the whole of the apical half of elytra black, tibiæ infuscated only at tips, the front ones somewhat thicker at apex, not longitudinally impressed near apex, but quite as strongly notched there, and the basal joint of front tarsi longer and more strongly curved.

HETEROMASTIX PUNCTICORNIS sp. nov.

♂ Deep black; head, prothorax, two basal joints of antennæ, and front coxa bright reddish flavous; front knees feebly diluted with red. With rather dense and short pubescence.

Head with a faint impression near each eye. Antennæ moderately long and rather thin, third to tenth joints each with a puncture on a small polished space near apex on the upper surface. *Prothorax* about twice as wide as long, margins fairly wide at base and sides, but feeble across apex, sides slightly wider near apex than at base, but not thickened; with distinct, submarginal punctures. *Elytra* almost parallel-sided to near apex; with dense and sharply defined punctures of moderate size. Length (♂ ♀), 4.4-5 mm.

♀ Differs in having the head smaller, with less prominent eyes, antennæ shorter, without polished punctate spaces, legs shorter, and in the abdomen.

Hab.—Queensland: Bribie Island in August (H. Hacker).—Type, C/2299 in Queensland Museum; cotype, I. 12255 in South Australian Museum.

In my table it would be associated with *H. geniculatus*, from which it differs in being smaller, middle and hind knees and scutellum black, antennæ much shorter, &c.; from *H. compar* it differs in being more robust, with darker legs and scutellum, antennæ slightly stouter, and many of the joints with a polished punctate space. Structurally it is closest to *H. nigripes*, and in appearance it is much like the female of *H. bryanti*. The shining spots on the antennæ from some directions look like granules.

HETEROMASTIX TRICOLOR sp. nov.

♂ Head, prothorax, scutellum, two basal joints of antennæ, parts of palpi and front legs (tarsi and tips of tibiae infuscated) flavous; rest of legs, mesosternum, metasternum, and abdomen black; elytra deep purple. With rather dense pubescence.

Head gently convex, with two feeble impressions in front. Antennæ moderately long and fairly stout, third joint slightly shorter than fourth, eleventh thinner and conspicuously longer than tenth. *Prothorax* about twice as wide as long, sides and base with fairly wide margins, front margin very short. *Elytra* parallel-sided to near apex; with crowded and sharply defined but rather small punctures, becoming smaller at base and apex. Length (♂ ♀), 4.5-6 mm.

♀ Differs in having the head smaller, with less prominent eyes, antennæ shorter and thinner, and abdomen not notched.

Hab.—Queensland: Mackay (Blackburn's and French's collections from R. E. Turner); Mapleton in October, and Brisbane in April (H. Hacker). New South Wales: Galston (D. Dumbrell); Sydney (A. M. Lea).—Type, I. 12258 in South Australian Museum; cotypes, C/2300 in Queensland Museum, and in National Museum.

A rather wide species; on several specimens the middle and hind knees,

the middle tibiae, and part of the third joint of antennae are pale; on one female the scutellum is rather dark. In my table would be placed with *H. anticus* and *H. geniculatus*, from each of which it is distinguished by its greater width and purple elytra: in the latter species the antennae are also decidedly longer and thinner; the former species is also considerably smaller, with elytra wider posteriorly, and antennae of male entirely pale.

HETEROMASTIX TARSALIS sp. nov.

♂ Black; prothorax, scutellum, parts of under surface of head, mesosternum, and legs flavous; tarsi and sometimes tips of tibiae infuscated. With moderately dense pubescence.

Head with slight interocular impressions. Eyes rather large and prominent. Antennae long and rather thin. *Prothorax* not twice as wide as long, margined throughout; with submarginal punctures. *Elytra* moderately wide, almost parallel-sided to near apex, with dense and sharply defined but rather small punctures. Front *tibiae* moderately dilated to, and notched on one side of apex; basal joint of front tarsi strongly curved on one side. Length, 4.5-25 mm.

Hab.—Queensland: Mount Tambourine in December and January (H. Hacker and A. M. Lea); National Park (Hacker).—Type, *I. 11875* in South Australian Museum; cotype, *C/2302* in Queensland Museum.

The front legs approach those of *H. tibialis*, but the notch at the apex of the tibiae is less pronounced, and the incurvature of the basal joint of tarsi is less; the elytra are also entirely black. In my table would be placed at F, from all the species of which it is distinguished by its front legs and pale scutellum; in addition *H. victoriensis* is a narrower species, with much darker legs; *H. paucillus* has longer and thinner antennae and black legs; and *H. simplex* has shorter antennae and darker legs. There are seven males before me, but I have been unable to identify the female amongst the many unidentified ones under examination.

Var.—A male from the Blue Mountains (in Dr. E. W. Ferguson's collection) structurally agrees with the type, but has the femora and tibiae (except the knees) infuscated.

HETEROMASTIX PUSILLIOR sp. nov.

♂ Black; prothorax, two basal joints of antennae, parts of under surface of head, and knees flavous. With short pubescence.

Head with two feeble interocular impressions. Antennae long and rather thin, third to eleventh joints subequal. *Prothorax* about twice as wide as long, margined throughout, lateral margins slightly increasing in width to near apex, where they are slightly thickened; with submarginal punctures. *Elytra* long, thin, and parallel-sided to near apex; with dense and rather small but sharply defined punctures, becoming smaller at base and apex. Length, 2 mm.

Hab.—Queensland: National Park in December (H. Hacker).—Type (unique), C/2301 in Queensland Museum.

The sides of the prothorax are dilated and thickened anteriorly, but not abruptly as in *H. pusillus* and allied species, so that in my table it would be associated with *H. victoriensis*, *H. paucillus*, and *H. simplex*, from each of which it is distinguished by its minute size. The tenth joint of the antennæ is slightly thicker than the ninth, but the difference is very slight, and not noticeable from several directions.

LAIUS FLAVONOTATUS Lea.

Specimens of this curious little species were taken by Mr. Hacker on mangroves, at Sandgate, in September.

BALANOPHORUS SCAPULATUS Fairm.

Several specimens, sexes, of this species from the Queensland National Park, and some females from the Richmond River and Dorrigo (New South Wales), have most of the head of a deep shining black, the tarsi and apical parts of middle and hind tibiæ more or less infuscated.

CARPHURUS LONGUS Lea.

C. atricapillis Lea, var.

Numerous specimens, all females, from the Cairns district, convince me that *C. atricapillis* should be regarded as one of many varieties of *C. longus*, and as the latter name was the first used it must be recognised as the typical one, although by no means the commonest. Starting with it the various forms before me, represented by four or more specimens, may be thus noted (the clothing and apical half of antennæ, which are dark on all the forms, not here taken into consideration):—

Form 1, ♀.—Typical *longus*. Entirely pale.

Form 2, ♀.—Like 1, except that half or more of the hind femora are deeply infuscated, or black.

Form 3, ♀.—Var. *atricapillis*. Like 1, except that part of the elytra is black or infuscated; the dark part sometimes continued along the suture for a short distance towards the base, and sometimes encroached upon by the suture; it occupies from one-fourth to three-fourths of the elytra, usually about one-third; occasionally the tip of the abdomen is dark.

Form 4, ♀.—Like 3, but with a conspicuous black or infuscate, slightly curved fascia, connecting the eyes; tip of abdomen always black.

Form 5, ♀.—Head with a fascia as in 3, elytra black, with a wide but somewhat irregular median flavous fascia, metasternum, tip of abdomen and parts of hind legs black, middle legs sometimes partly dark, and some of the other segments of abdomen infuscated in parts.

There is a single specimen with the elytra almost entirely dark, the hind femora and coxae and part of the metasternum dark, and the interocular fascia distinct; another has the head entirely pale, the elytra entirely dark, and parts of the middle and hind legs and of the metasternum dark.

So many females of this species have been before me that I think it almost certain that I have seen males, but not associated them with the species. If the male is really before me it may be *C. elegans*, of which only the male is known, and which has remarkable front tarsi.

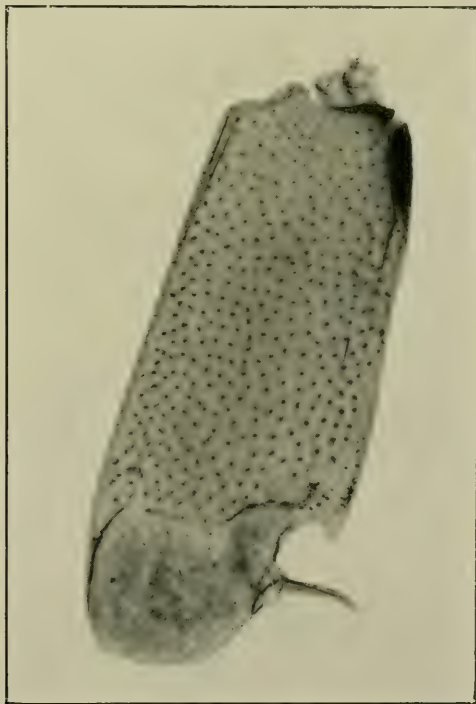
CARPHURUS PISONIÆ sp. nov.

♂ Flavour; two spots near base of head (sometimes conjoined) and metasternum black, five to seven apical joints of antennæ infuscated. With sparse white pubescence and straggling black hairs.

Head rather wide and irregularly impressed between eyes, with two oblique median elevations; with irregular punctures, becoming crowded near eyes. *Antennæ* moderately long and scarcely serrated. *Prothorax* slightly longer than greatest width (near apex), a shallow open depression near base; with a few scattered punctures. *Elytra* almost twice the length of prothorax, and much wider at base, each side near apex with a deep semicircular notch, the anterior end marked by a subtriangular portion of the elytron, the posterior by a long acute spine directed forwards and outwards; with dense and sharply defined punctures, suddenly terminated near apex. Basal joint of front *tarsi* with a small black comb. Length, 3.4 mm.

Hab.—Northern Queensland (Blackburn's collection); Cairns district, in abundance on sticky seeds of *Pisonia brunoniana* (F. P. Dodd).—Type, I. 11938 in South Australian Museum; cotype, C/2341 in Queensland Museum.

Allied to *C. cristatifrons*, and with similar elytral armature, but the head bimaculate and the elytra not; the head from the side appears evenly convex, whereas on *cristatifrons* the strong ridges, abruptly terminated in front, give a very different appearance; its head also has much larger and deeper impressions than the present one. The impressions between the eyes are not very deep; there are two oblique elevations between them, and these, with a feeble longitudinal interocular elevation, appear to form a V (or feeble Y); each fork of the V touches one of the black spots. The spines on the elytra are broken on many of the specimens, and when about half of each is left the notch from some directions appears as an almost circular hole; the part beyond the spines is sometimes of the same colour as the rest of the elytra, but is usually of a lemon-yellow colour, and is impunctate. The abdomen is of a somewhat redder tone than the other pale parts. Under the microscope the tarsal comb is seen to consist of ten or eleven teeth. More than one hundred specimens were removed from the seeds, but all are males.



CARPHURUS PISONIÆ Lea. Upper figure, anterior leg; lower figure, elytron.
Photos.—H. Hacker.

CARPHURUS PURPUREIPENNIS sp. nov.

♂ Flavous or reddish flavous; elytra deep purple; mesosternum, metasternum, coxæ, most of femora, and six or seven apical joints of antennæ, black or blackish. With rather long, blackish hairs, rather dense in places; elytra with short, whitish pubescence.

Head rather large, irregularly impressed between eyes, a rather wide and deep impression behind them, a hairy longitudinal ridge crossing its middle, an acute oblique ridge on each side of middle between eyes, a curved and slightly elevated line in front; base punctate and transversely strigose. *Antennæ* long, moderately stout, most of the joints serrated. *Prothorax* slightly longer than greatest width, a wide shallow subbasal depression; with a few scattered punctures. *Elytra* more than twice the length of prothorax; each side at basal third with a triangular pale-tipped projection; punctures dense and sharply defined, becoming sparser and smaller on tips. Basal joint of front *tarsi* with a black inner comb. Length (♂ ♀), 6.8 mm.

♀ Differs in having the head smaller, with feeble depressions only, without ridges, and less hairy, apex of prothorax less produced, sides of elytra unarmed, legs and antennæ shorter, and front tarsi simple.

Hab.—Northern Queensland (Blackburn's collection); Cairns (E. Allen and F. P. Dodd); Yarrabah and Mount Bellenden-Ker (Dr. E. Mjöberg).—Type, I. 12233 in South Australian Museum; cotype, C/2303 in Queensland Museum.

Allied to *C. armipennis*, but readily distinguished by the two acute ridges on head: these, when viewed from behind, appear as two conical tubercles. On several specimens the suture near the base is obscurely reddish; the base of the prothorax is sometimes of a different shade of colour from its other parts. On the middle of each elytron of the male, in a line with the lateral teeth, there is a space like a small scar; it appears at a glance to be accidental, but is alike on the six males under examination.

CARPHURUS MACULICOLLIS sp. nov.

♂ Black and flavous, or reddish flavous. With short whitish pubescence and long dark hairs.

Head rather large and unevenly convex, a rather long, shallow, oblique depression each side in front; with unevenly distributed punctures; base transversely strigose. *Antennæ* moderately long, fourth to tenth joints serrated. *Prothorax* distinctly longer than wide, widest at about apical fourth, apex not much wider than base, a wide shallow depression near base; punctures fairly numerous on sides, sparse elsewhere. *Elytra* more than twice the length of prothorax, sides rather suddenly dilated near base, apex about one-third wider than base; with dense and small, but rather sharply defined punctures, becoming minute on tips. Basal joint of front *tarsi* with an inner comb from base to apex. Length (♂ ♀), 5.7 mm.

♀ Differs in having the head smaller, with shallower depressions and sparser hairs, eyes much smaller and less prominent, antennæ shorter, legs shorter and front tarsi combless.

Hab.—Queensland: Blackall Range in October (F. E. Wilson); Brisbane (H. J. Carter); National Park (H. Hacker); Mount Tambourine (A. M. Lea).—Type, *I. 12234* in South Australian Museum; cotype, *C/2304* in Queensland Museum.

The eyes of the male are larger and more prominent than usual, their combined width being almost equal to the space between them; on the female their combined width is scarcely half that of the intervening space; on the head of the male the dark hairs form two or three feeble fascicles. The species is close to *C. pallidipennis*, but the male has the head wider, with larger eyes, impressions different, and small black fascicles. Elytra with smaller punctures, and a dark spot on each side near the scutellum; in my table the specimens with immaculate elytra would be associated with *C. pallidipennis*, but the spotted ones not with *C. marginiventris*, as the spots are too short and the elytral punctures finer; the heads of the males are also differently sculptured. On typical males the pale parts are the head (except for a transverse black mark near the base—on some specimens owing to the projection of the prothorax it appears to be at the base itself), prothorax (except for a large black spot on each side not quite reaching the base), elytra (except for a rounded black spot on each side of the scutellum), scutellum, prosternum, mesosternum, tips and sides of abdominal segments, three to five basal joints of antennæ, trochanters, knees, and most of tibiæ and tarsi. The typical females are coloured much as the males except that the black part of the head is larger, and that the outer apical angles of the elytra are infuscated, the basal spots are sometimes more extended. On most specimens, of both sexes, there is a dark streak, almost the entire length of the upper edge of the hind tibiæ.

Var. A.—Seven females, from Mount Tambourine, differ from typical females in having the head entirely pale (on one of them there is, however, a very small medio-basal spot), elytra entirely pale, and more of the antennæ dark; they differ from females of *pallidipennis* in being larger, and with smaller elytral punctures; it would, however, be unsafe to identify specimens of either species from females only.

Var. B.—A female, from Mount Tambourine, has the head entirely pale, as also the elytra; except for a slight infuscation on each side near the apex, most of its abdomen is pale.

Var. C.—A male, in the Queensland Museum, has the prothorax and elytra entirely pale; it seems fairly close to the description of *C. xanthochrous* and *C. tachyporoides*, but its scutellum (as on all the other specimens before me) is pale instead of black.

NECCARPHURUS ANGUSTIBASIS sp. nov.

♀ Black and highly polished; muzzle, basal half of antennæ, and extreme base of prothorax flavous.

Head deeply impressed between eyes; inter-antennary space elevated and subtuberculate. *Antennæ* rather long and thin, none of the joints transverse. *Prothorax* longer than wide, apex more than twice the width of base, sides strongly rounded and narrowed from apex to near base, and then subparallel to base, which is feebly bilobed, a deep, transverse, open, subbasal depression. *Elytra* slightly wider than widest part of prothorax, in parts slightly undulating; almost impunctate. Basal joint of front *tarsi* lopsided, with an inner comb. Length (♂ ♀), 2.5-3 mm.

♀ Differs in having the head smaller, without transverse impression, inter-antennary space very feebly elevated, antennæ thinner, and front tarsi simple.

Hab.—Queensland: Cairns district (F. P. Dodd and A. M. Lea); Innisfail.—Type, *I. 9182* in South Australian Museum; cotype, *C/2305* in Queensland Museum.

On several specimens the sides of the elytra near the base are obscurely diluted with red, on one female parts of the legs are obscurely reddish; from four to six apical joints of the antennæ are more or less deeply infuscated. One of the specimens was attached to a sticky seed of *Pisonia brunoniana*. In general appearance the species is close to *N. sobrinus*, but the head of the male is differently excavated, and the inter-antennary elevations differ as follows:—

sobrinus.

angustibasis.

From directly in front.

They appear to terminate on an even line posteriorly, each being separately rounded there.	The median one is posterior to the others and on a lower level.
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From behind.

The head appears to have two small tubercles..	The head appears to have a median flat-topped convexity.
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From each side.

The head appears to have a tubercle before each eye, one behind it and one at its middle, the front one being more conspicuous than the others, which disappear when viewed from a slightly lower elevation. ⁴	The head does not appear to have a tubercle behind the eye and at its middle.
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⁴ Lea, Trans. Ent. Soc. Lond., 1909, fig. 6.

HELCOGASTER PUNCTIPENNIS Lea.

A male of this species, from Cairns, has only five joints of each antenna dark; by a printer's error⁵ the female was described originally as having the head "absolutely" bifoveate in front, instead of "obsoletely"; two other females have the foveae rather distinct, and one of these has the inner apices of the elytra obscurely testaceous.

HELCOGASTER VARIUS Lea, var. **FLAVOPICTUS** var. nov.

Four specimens, two of each sex, from Bribie Island, appear to represent another variety of this species; they are rather larger than usual, up to 5.5 mm., and have the pale portion of the elytra larger; their dark parts are a narrow triangle about the scutellum, and the tips for about one-fourth their length at the suture, and sides (but more between); the pale parts of the legs are brighter and more extended than in other described varieties. On the males the black patch at the base of the head is terminated before the sides; on the females there is a narrow irregular reddish line near each eye, and on one of them the two are transversely connected.

HELCOGASTER INSIGNICORNIS sp. nov.

♂ Black and flavous. Upper surface with sparse, dark, erect hairs.

Head wide, with a large excavation behind muzzle. Antennae with first joint thick, with a fovea near apex; second short, third to fifth rather wide, the following ones rather thin. *Prothorax* about as long as the greatest width, sides dilated from base to apex, near base with a large depression closed behind and at the sides, but shallowly connected, towards each side, with a shallow, latero-apical depression. *Elytra* rather long, with a few inconspicuous punctures. Basal joint of front *tarsi* with a small black comb. Length (♂ ♀), 2.25-3 mm.

♀ Differs in having the head narrower, with eyes slightly smaller, excavation replaced by a rather shallow depression, that is notched posteriorly in middle; antennae shorter, basal joint much smaller and non-foveate, third and fifth joints smaller; prothorax with subbasal depression not, or scarcely, connected with latero-apical ones (and these often scarcely defined); and legs shorter, with front *tarsi* combless.

Hab.—Queensland: Mount Tambourine (A. M. Lea).—Type, *I. 11911* in South Australian Museum; cotype, *C/2306* in Queensland Museum.

Allied to *H. foveicornis*, but basal joint of antennae of male smaller and of different shape, elytra with a pale basal zone and, at most, only three apical segments of abdomen entirely black. The female is much like females of *H. tuberculifrons*, *H. simpliciceps*, *H. maculiceps*, and others having bicolorous elytra, but the male is at once distinctive. On the male the black parts are the apical three-fourths of elytra and the tip (one or two segments) of abdomen; the

⁵Lea, Trans. Ent. Soc. Lond., 1909, p. 225.

antennæ have from three to five basal joints and the tip of the eleventh pale, the others being deeply infuscated; the head and prothorax are of a slightly redder tone than the other pale parts. The excavation on its head occupies about one-third of the width across eyes, its bottom is somewhat irregular and hind margin semicircular; only the five apical joints of its antennæ are seen to be longer than wide from most directions, but from several the two preceding joints seem also to be longer than wide. On two males the metasternum is dark; on all the females it is dark, and sometimes the mesosternum as well. On many of the females the head, except at base, and upper portion of the first joint of antennæ, are more or less deeply infuscated, on some only the muzzle is infuscated, on nine specimens the head is entirely pale; on several the apical joint of antennæ is entirely dark; the dark segments of the abdomen vary in number from one to three. There are some fine punctures and strigosities behind the eyes, but they could be easily overlooked; there are no sharply defined punctures on the elytra.

One male (also from Mount Tambourine) differs from the others in having the excavation on the head larger, and at bottom with a distinct longitudinal ridge (on the others the bottom of the excavation is obscured by a mealy substance), and the antennæ entirely pale, although the basal joints are paler than the apical ones.

HELCOGASTER HACKERI sp. nov.

♂ Black; head, prothorax, and most of antennæ and of legs flavous. Sparsely clothed with white pubescence, and with a few dark hairs.

Head wide, with a large, deep, interocular excavation. Antennæ rather long, moderately serrated, apical joint almost as long as two preceding combined. *Prothorax* distinctly transverse, apex wider than base, near base with a rather wide and deep, closed depression. *Elytra* moderately long; with rather dense and minute rugulose punctures. Basal joint of front *tarsi* with a black inner comb. Length (♂ ♀), 2.25-3.5 mm.

♀ Differs in being larger, head smaller, without tubercles or excavation, with a shallow depression each side in front, and a shallow median line, punctures sparser and more sharply defined, and black, except that the muzzle is obscurely reddish; the antennæ are thinner and much darker, prothorax with only the base and sides pale, and narrower across apex, abdomen larger and wider, legs with hardly more than the knees pale, and front *tarsi* simple.

Hab.—Queensland: Bribie Island in August (H. Hacker and A. M. Lea); Brisbane in October (Hacker).—Type, *I. 11905* in South Australian Museum; cotype, *C/2307* in Queensland Museum.

One of the most interesting beetles occurring on the island. It is close to *H. foveiceps*, to which the specimens at first glance appear to belong, but on that species the sub-basal foveæ of the head leave a medio-basal space, which projects subtriangularly forwards, the projection itself longitudinally grooved; on the present species the place of the projection is taken by a rather large depression,

which appears on some specimens to extend to the base itself, although it does not do so; from the inter-antennary space a wide and uneven elevation projects subtriangularly backwards into the excavation, and from directly behind the sides of this elevation appear like two minute tubercles (on *foveiceps* a smaller median one may also be seen). I have repeatedly compared the heads of the males from many points of view, and cannot satisfy myself that the two forms belong to but one species, despite the close similarity of all parts but the head, and the curiously coloured antennæ; the females of the two species are practically indistinguishable. The middle of the base of the head of the male is usually black, but, as that part is normally concealed, the head appears to be entirely pale; the antennæ are usually entirely pale, but with the middle joints slightly darker than the others, but sometimes much darker; the tarsi and middle and hind tibiæ are usually distinctly infuscated; on the female the tip of the antennæ is sometimes black, but is usually obscurely paler than the preceding joints. The head of the male is densely punctate, but the punctures are not sharply defined, its prothorax also has fairly numerous punctures towards the sides; on the female those of the prothorax are more distinct but scarcely larger.

HELCOGASTER TRIFOVEICEPS sp. nov.

♂ Flavous; scutellum, abdomen (except tips of segments on upper surface), mesosternum, metasternum, apical half of antennæ, and parts of legs, black or infuscated. With sparse, white pubescence; denser on head and abdomen than elsewhere.

Head wide, with a rather deep, transverse, interocular depression, its posterior margin trisinate; front with an obtuse elevation having two small tubercles posteriorly. Antennæ moderately long. *Prothorax* distinctly transverse, base much narrower than apex, near base with a large, deep, closed, transverse depression; punctures rather dense on sides, sparse elsewhere. *Elytra* rather short, dilated posteriorly; with sparse, small, rugulose punctures. Basal joint of front *tarsi* with a small black comb at inner apex. Length, 2.5-3 mm.

Hab.—Queensland: Dalby (Mrs. F. H. Hobler).—Type, I. 12124 in South Australian Museum; cotype, C/2308 in Queensland Museum.

The sculpture of the head, which, with the prothorax and elytra, are entirely pale, readily distinguishes this species from all previously named ones. At least four of the basal joints of antennæ are flavous, the fifth and sixth are also sometimes scarcely darker; the coxæ and bases of femora are black, the tibiæ are usually slightly infuscated in the middle. The head is opaque, owing to dense punctures; these are individually so small as to be scarcely traceable, and in addition are partly concealed by clothing; from some directions the interocular space appears to have three small foveæ connected by a curved line; from directly in front the median one is seen to be much larger than the others; from behind the two small tubercles on the interocular elevation are quite distinct.

HELCOGASTER TRISINUATUS sp. nov.

♂ Flavous; apical three-fifths of elytra, tip of abdomen, and six or seven apical joints of antennæ black, metasternum infuscated. A few dark hairs scattered about.

Head with a deep interocular excavation, its posterior end trisinuate, a large obtuse tubercle in front; with sparse and small punctures, becoming denser about base. Antennæ rather long. *Prothorax* about as long as the greatest width, base decidedly narrower than apex, a large, rather deep, transverse, closed, sub-basal depression. *Elytra* moderately long, almost parallel-sided; with fairly numerous and small but (for the genus) rather sharply defined punctures. Tip of *abdomen* with two small processes. Basal joint of front *tarsi* with a small black comb. Length (♂♀), 2.5-3.75 mm.

♀ Differs in having the head smaller, a shallow fovea representing the middle of the excavation, and a feeble depression on each side, its sides; frontal tubercle much smaller and more obtuse, antennæ shorter and thinner, elytra less parallel-sided, abdomen with the tip simple, and front *tarsi* combless.

Hab.—Queensland: Cairns district (A. M. Lea).—Type, *I. 11949* in South Australian Museum; cotype, *C/3209* in Queensland Museum.

In my table⁶ would be placed with *F*, from all the species of which it is distinguished by its pale head. At first glance it appears to belong to *H. punctipennis*, but the sculpture of the head of the male is different, and the elytral punctures are smaller; from the male of *H. seminigripennis* it is distinguished by the large cephalic excavation, with its base conspicuously trisinuate, the median sinus wider than the others. Six males and twelve females were obtained.

DASYTES SUBELLIPTICUS sp. nov.

Black, parts of antennæ and of legs flavous. With rather dense, depressed, ashen pubescence.

Head with small and rather dense punctures; with two feeble depressions in front. Antennæ slightly passing base of prothorax, most of the joints transverse. *Prothorax* widely transverse, base and sides finely margined; with very small punctures. *Elytra* at base scarcely wider than prothorax, sides slightly dilated to beyond the middle; with dense and small, but rather sharply defined punctures. Length, 1.75-2 mm.

Hab.—Queensland: Bribie Island (H. Hacker and A. M. Lea).—Type, *I. 12285* in South Australian Museum; cotype, *C/2310* in Queensland Museum.

A minute elliptical species, much like *D. ellipticus* on a greatly reduced scale; in my table,⁷ on account of the bicoloured legs, it would be associated with *D. bourgeoisi* (now *D. julesi*), but it is much smaller and wider in proportion; in

⁶ Lea, Trans. Ent. Soc. Lond., 1909, p. 215.

⁷ Lea, Trans. Ent. Soc. Lond., 1909, p. 240.

size it is about equal to *D. corticarioides*. The femora are usually deeply infuscated, except at base and apex; on some specimens the front legs are almost entirely pale; the apical half, or less, of the antennæ is infuscated; on some specimens vague remnants of a subbasal depression may be seen on the pronotum, but from most of them even these are absent.

FAMILY TENEBRIONIDÆ.

PALORUS EUTERMIPHILUS sp. nov.

Bright castaneous. Upper surface glabrous, under surface almost so.

Head moderately wide, with rather dense punctures. Clypeus with smaller punctures than on rest of head, its hind suture semicircular. Eyes small, without canthi, extreme sides only visible from above but distinct from below. Antennæ scarcely longer than their distance apart, parallel-sided except near base, third to tenth joints distinctly transverse, the eleventh almost as long as wide. *Prothorax* moderately transverse, sides rounded, distinctly dilated to near apex, and finely margined, hind angles rectangular; punctures slightly larger but otherwise as on head. *Scutellum* widely transverse. *Elytra* opaque, parallel-sided to near apex, base wider than base of prothorax, but less than its greatest width; with deep striæ containing rather shallow punctures, interstices acutely costate almost throughout. *Under surface* with dense punctures on prosternum, mesosternum, and sides of metasternum, much sparser and smaller elsewhere. *Legs* short. Length, 2.75-3 mm.

Hab.—Queensland: Townsville, twelve specimens from termites' nest, *Eutermes* sp. (G. F. Hill, No. 1033).—Type, *I. 11588* in South Australian Museum; cotype, *C/2311* in Queensland Museum.

This species should perhaps have been regarded as the type of a new genus, but I am averse from proposing new genera for inquilines except on very strong grounds. The entire absence of a club to the antennæ and the eyes not encroached upon by canthi seem to exclude it from *Tribolium*, to the species of which it bears a strong general resemblance. The antennæ and eyes, except that the latter are smaller, with their edges just visible from above, are much as in several species of *Palorus*. The dilated front of prothorax, and opaque elytra, with acute costæ, are very distinctive amongst the allied genera. The colour is an almost uniform and rather pale castaneous, the antennæ are slightly darker than the head, but the terminal joint is slightly paler.

FAMILY MELANDRYIDÆ.

PAROMARTEON MUTABILE Blackb.

I have previously⁸ commented upon this species, but as there are now before me many other specimens, including several sharply defined and more or less constant varieties, it appears desirable to name some of them. The sexes

⁸ Lea, Trans. Roy. Soc. S. Aust., 1917, p. 168.

may be readily distinguished by the abdomen; in the male the middle of the apical segment is gently incurved, in the female that segment is larger, and the tip is evenly rounded. The under surface, except the prosternum, appears to be always deep black.

Var. nigripenne var. nov.—From Victoria (Dividing Range), New South Wales (Sydney and Dorrigo), and Queensland (Brisbane), there are nine specimens with the elytra entirely black or blackish, and the head usually with the basal half black.

Var. apicale var. nov.—Twenty-one specimens, from Brisbane and Bribie Island, have the apical two-fifths of elytra and the basal half of head deep black; the scutellum varies from flavous to deeply infuscated; on some of the males the hind femora are infuscated in the middle.

Var. parvum var. nov.—Four specimens, from Bribie Island, are close to the preceding variety, but are smaller (3 mm. only), and have the apical half of elytra black, but the head and scutellum entirely pale.

Var. fasciatum var. nov.—Five specimens, from Bribie Island, are very small (3.3-5 mm.), and their elytra have two black fasciae: a complete narrow one at the apical two-fifths, and an interrupted one at the apical fifth; the hind and middle femora are partly black; in the males the head is almost entirely dark, in the females it is entirely pale.

FAMILY MORDELLIDÆ.

MORDELLA BRIBIENSIS sp. nov.

Black; base of antennæ and parts of front legs obscurely diluted with red. Clothed with black and greyish-white pubescence.

Comparatively short. Scutellum semicircular. Pygidium rather short, its apical portion almost parallel-sided and then truncated. Spurs to hind tibiæ unequal. Length, 3-4 mm.

Hab.—Queensland; Bribie Island (H. Hacker and A. M. Lea).—Type, *I.* 12132 in South Australian Museum; cotype, *C*/2312 in Queensland Museum.

The pale pubescence is uniform on the head, and so placed on the prothorax as to distinctly define three black spots: a large median one and a smaller one on each side; on the elytra it forms a fairly conspicuous narrow basal edging, but elsewhere the pale hairs are scattered thinly and do not form spots; from some specimens, except at the base, they are absent; from the metasternum the pale pubescence is almost absent, and it is absent from a large spot on each side of four basal segments of abdomen. About five joints of the antennæ are transverse. The external sexual differences are feebly defined; the male has the apical portion of the pygidium more parallel-sided, and the front tarsi slightly wider, although thin. In some respects the species is close to some forms of *M. baldiensis*, and it

belongs to the same group,⁹ but the pale pubescence of the prothorax bounds three sharply defined dark spots, and the pygidium is differently shaped; from the form of *M. nigrans*, with somewhat similar prothoracic markings, it is distinct by the pygidium, its narrow portion being only about half as long as on that species.

FAMILY CANTHARIDÆ.

HORIA CEPHALOTES Oliv., Ent., iii, p. 5, pl. 1, fig. 3.

A specimen labelled "Johnstone Riv.," in Miskin's writing, is a male of this species; remarkable for its wide flat head, and conspicuous jaws. The Queensland locality, however, needs confirmation, as the species is a well-known Javanese insect.

FAMILY EDEMERIDÆ.

PSEUDOLYCUS HÆMORRHOIDALIS Fab., var. **MARGINATUS** Guer.

Form 5.—Three specimens from the Queensland National Park differ from the preceding four forms of this variety in having the sides of the prothorax entirely pale, the dark discal portion is wider at the base than the apex, and the elytra are blackish for a short distance from the base—near the suture on two of them there is a pale spot on each side of the base of the head.

MORPHOLYCUS COSTIPENNIS Lea.

A female of this species, from the Queensland National Park, has the red of the prothorax reduced to a small spot on each side of the base.

COPIDITA MARITIMA Lea.

A specimen, from Bribie Island, and another, from Stradbroke Island, have similar elytra to those of a specimen commented upon as in Mr. Carter's collection, except that there is a slight infuscation on each side of the scutellum: on the Bribie Island one the dark prothoracic markings are conjoined, on the other they are not conjoined across the middle. Another, from Bribie Island (a small male), has the cephalic spot larger than usual, and the derm of both scutellum and elytra entirely black.

COPIDITA TENUICOLLIS sp. nov.

♂ Flavous; three irregular lines on prothorax, elytra (except suture and extreme sides), knees, parts of tarsi and two apical joints of antennæ, black or infuscated. Densely clothed with short, ashen pubescence.

Head rather long, gently convex between eyes, with rather dense and sharply defined punctures, becoming crowded at base, and smaller in front; jaws notched at apex. Eyes large and coarsely faceted. Antennæ long and thin, most of the joints cylindrical, eleventh semi-double. *Prothorax* much longer than wide, sides slightly dilated near apex, base narrowly margined; punctures

⁹ Lea, Trans. Roy. Soc. S. Aust., 1917, p. 217.

crowded and larger than on head. *Elytra* much wider than prothorax, parallel-sided to near apex; each with four discal costæ; punctures small and crowded. *Legs* long and thin; tibiæ bispinose at apex; claws each with an obtuse basal appendix. Length, 11 mm.

Hab.—Queensland: Stradbroke Island in December (H. Hacker).—Type (unique), C/2313 in Queensland Museum.

The elytra are much as in *C. macleayi*, and the prothorax also has three dark markings, but the prothorax itself is decidedly longer and thinner, with much stronger punctures, head immaculate between eyes, and these decidedly larger, and the antennæ entirely pale. On the prothorax the dark part on each side is continuous from base to apex, and widest at the apical third, the median line is thinner, shorter and irregular; the pale sutural portion is slightly wider than the scutellum at the base, and becomes very narrow posteriorly.

COPIDITA NIGRIPENNIS sp. nov.

♂ Flavous, elytra blackish with a vague bluish gloss, parts of tarsi and three spots on prothorax slightly infuscated. Rather densely clothed with ashen pubescence, more conspicuous on elytra than elsewhere.

Head rather long, with dense sharply defined punctures, becoming smaller in front; jaws notched at tips. Antennæ long and thin, second to sixth joints cylindrical (the following ones missing). *Prothorax* long and thin, sides somewhat dilated near apex, base margined and bisinuate; punctures crowded and slightly larger than on head. *Elytra* much wider than prothorax, parallel-sided to near apex, each with four discal costæ, of which the third is scarcely traceable; with crowded and mostly rugose punctures, but many sharply defined. *Legs* long but not very thin; tibiæ unispinose at apex; claws thin, each with a small basal appendix. Length, 10 mm.

Hab.—Queensland: Bribie Island (H. Hacker).—Type (unique), C/2314 in Queensland Museum.

In some respects close to *C. mira*, but prothorax longer and less dilated in front, and palpi normal; from the preceding species it differs in having the legs thicker, with only parts of the tarsi infuscated, the tibiæ unispinose, and less of elytra pale; the three faint infuscations on the prothorax are across the apical third; the suture is very obscurely and narrowly diluted with red.

DOHRNIA SEMIFLAVA sp. nov.

♀ Black and flavous. Head and prothorax rather sparsely clothed, elsewhere with short, dense pubescence.

Head gently convex between eyes, shallowly depressed in front; with dense and rather small but sharply defined punctures; jaws notched at apex. Eyes rather long and finely faceted. Antennæ long and thin, the joints cylindrical. *Prothorax* about as long as the greatest width (near apex), a

narrowly impressed line (dilated in middle) across base, and a shallow depression across apex; punctures as sharply defined as on head, and slightly larger. *Elytra* much wider than prothorax, parallel-sided to near apex, each with four discal costæ; punctures crowded and usually sharply defined, but some transversely confluent. Length, 6-7 mm.

Hab.—Queensland: Brisbane (H. Hacker); Glen Lamington (Dr. E. Mjöberg).—Type, *C/2315* in Queensland Museum; cotypes, *I.12241* in South Australian Museum, and in Stockholm Museum.

Referred to *Dohrnia* on account of the eyes. The flavous parts of the type are the head between the muzzle and eyes, base of six first joints of antennæ, and under surface of the first two, palpi (except the tips), prothorax (both surfaces), scutellum, basal half of elytra, and legs (except tips of middle and of hind tibiæ, and the middle and hind tarsi, which are infuscated). The specimen in the South Australian Museum is like the type, except that the hind femora are also infuscated; the other cotype has the legs (except the front coxæ) and antennæ entirely dark, and with slightly less of the elytra pale. On all three specimens the dark parts usually have a metallic gloss; only two of the discal costæ are at all distinct on each elytron.

FAMILY CURCULIONIDÆ.

EUOPS TUBERCULATUS sp. nov.

♀ Black, in most parts with a slight purplish gloss.

Head with sparse and irregularly distributed punctures. Eyes large, almost touching in middle. Rostrum rather short, dilated and finely serrated at apex, and narrowed to base. Antennæ short; club stout, about the length of six preceding joints combined. *Prothorax* about as long as basal width, narrowed to apex, a distinct bisinuate punctate line near base, a shallow transverse impression on each side at apical third, a rather large but obtuse tubercle in front of each; sides with distinct punctures, upper surface almost impunctate. *Elytra* not much longer than wide, much wider than prothorax; with somewhat irregular rows of fairly large punctures; third interstice at basal third with an obtuse tubercle, between it and base shallowly depressed, sixth interstice with a small obtuse tubercle at summit of apical slope; each shoulder with an acute conical tubercle, projecting outwards. *Abdomen* irregularly punctate and strigose, four basal segments each with a short, hairy, double stripe across middle; pygidium with rather large punctures on most of its surface. *Femora* stout; front tibiæ bisinuate on lower surface. Length, 3 mm.

Hab.—Queensland: National Park in December (H. Hacker).—Type (unique), *C/2316* in Queensland Museum.

Readily distinguished from all other Australian species by the tuberculate upper surface, with armed shoulders.

FAMILY CHRYSOMELIDÆ.

CHALCOLAMPRA TENUIS Lea.

Mr. Hacker has taken several specimens of this species in the National Park, near Brisbane, and these have the elytral markings not in the form of four abbreviated fasciæ connected with the suture only, but the three apical ones are connected at their outer edge as well, so that there are two pale elliptical spots on each side of the suture (one postmedian and one subapical); on one specimen the two basal fasciæ are free externally, and on another the three apical fasciæ are not quite connected externally, so that the spots are not entirely enclosed.

DITROPIDUS DAVISI Saund.

This species is abundant in South Australia and is very variable in size and markings; the length ranges 2.25-3.75 mm.; the width, apart from sex, also varies, the smaller specimens being decidedly narrower than the larger ones. The male is narrower and less robust than the female, its abdomen is smaller, nonfoveate, incurved to the middle, and with the tips of the pygidium slightly produced forwards; the seriate punctures on the elytra are really rather small, but owing to "waterlogging" appear to be decidedly large; their true sizes may be seen from an oblique direction. All the forms have the intercoxal process of the prosternum semicircularly emarginate posteriorly, with the hind angles sharply produced; the legs and parts of the under surface are also variable, but, disregarding these, some of the forms before me are as follows:—

Typical.—On this form (a rather rare one) the prothorax is immaculate, the head is dark at the base, and the elytra have the base, apex, and suture dark, so that each elytron has a large pale spot, but each spot is sometimes greatly reduced in size and sharpness. *Hab.*—New South Wales and South Australia.

Var. A.—Like the typical form, except that the head is entirely pale; on one specimen the elytral spots are greatly reduced in size and brightness. *Hab.*—South Australia (Ooldea and Port Lincoln).

Var. B.—Like the typical form, except that it is not quite so wide, and that the prothorax has a transverse black or blackish fascia extending almost to its sides; the fascia varies from about one-third the length of the segment to covering its entire surface except for narrow edgings, occasionally it actually touches parts of the sides; the elytral spots on such specimens are usually greatly reduced in size, and the black part of the head is greatly extended; on one specimen of it the prothoracic fascia appears as three semi-detached spots; on another the fascia appears as a slight and rather narrow infuscation. *Hab.*—South Australia.

Var. C.—Like the preceding variety, except that the prothoracic fascia is broken up into two spots. *Hab.*—South Australia (Adelaide and Lucindale).

Var. D.—Prothorax entirely dark, head dark except for parts of muzzle;

a fairly large but ill-defined pale spot on each elytron: one female of the variety is still attached to a male of B; another female has a part of the scutellar lobe pale; one male from Gladstone (Queensland) of the variety agrees perfectly in outlines with the typical male, but has distinctly coarser punctures on both prothorax and elytra; its elytral spots are very obscurely defined, and the legs and prosternum are almost entirely dark. *Hab.*—Queensland, New South Wales, South Australia.

Var. E.—Head and prothorax coloured as on the typical form, but elytra with the red extended to cover most of the surface, excluding a rather narrow but somewhat zigzag strip at the base; the suture is also very narrowly dark, but near the apex the dark part is dilated to form an oval spot; the apex, however, is entirely pale. *Hab.*—Queensland (Charters Towers).

Var. F.—Head and prothorax entirely pale reddish flavous, except that the base of the latter is very narrowly black; elytra flavous, the base and suture very narrowly black, a narrow part of the apex black, but the black part slightly advanced along the suture and sides, so as to be strongly bisinuate on its inner edge. On this variety, except for the claws, the legs are entirely pale. *Hab.*—South Australia (Moonta).

There are other varietal forms before me, but I have not considered it advisable to attach letters to those of which I have seen but one specimen. It is probable that several published names will have to be treated as synonyms of the species.

DITROPIDUS IGNITUS sp. nov.

♂ Brilliant coppery red, in places coppery green, under surface and legs black, with a bluish gloss; labrum and basal half of antennæ reddish. Under surface and legs with rather sparse pubescence.

Head with sharply defined punctures of medium size; median line distinct. Eyes separated about the length of two basal joints of antennæ. *Prothorax* at base more than twice as wide as the median length, sides strongly rounded; with dense, sharply defined, and not very small punctures. *Elytra* not much longer than the basal width, which is almost twice that of the apical; with rows of not very large punctures, on the sides set in deep striæ; interstices with small and fairly numerous punctures. *Legs* moderately stout, front ones slightly longer than hind ones. Length (♂ ♀), 2.5-3 mm.

♀ Differs in being slightly more robust, eyes about one-third more distant from each other, elytra less narrowed posteriorly, legs somewhat thinner, the front ones no longer than the hind ones, and in the abdomen.

Hab.—Queensland: Cairns (E. Allen); Bowen (Aug. Simson).—Type, I. 10925 in South Australian Museum; cotype, C/2317 in Queensland Museum.

A beautiful, briefly oblong-elliptic species, in general appearance close to *D. venustus* and fairly close to *D. costatus*, but distinguished from both by the non-strigose sides of prothorax; the punctures there are not even confluent, and

are mostly slightly smaller than those in the middle. The eyes of the male are more widely separated than in the male of *D. doriae*. From some directions the head appears coppery red, from others coppery green; from some the prothorax appears coppery green throughout, but usually only the sides appear to be of that colour; the scutellum and tips of elytra, the latter varying with the point of view, are also coppery green; the pygidium similarly varies from coppery green to coppery red. In some lights most of the upper surface of some specimens appears purple. The seriate punctures on the elytra are about as long as those on the prothorax, but narrower.

Vars.—One male has the head, prothorax, and pygidium purple, the prothorax in some lights with a bluish gloss, its scutellum and elytra are bright coppery green, except the tips of the latter, which are purple, its tibiae are obscurely diluted with red in parts; a female mounted with it has the head and prothorax coppery green, the muzzle of the former and the sides of the latter purplish in some lights, its elytra are deep blue, with the sides and punctures purplish, the purple from some directions appearing to cover almost the whole surface, its pygidium is blue and purple. The only specimen from Bowen, in the Museum, is a male, and has the whole of the upper surface and pygidium deep blue, altering to purple; from some directions the prothoracic specimens have a coppery glitter (as on *D. striatipennis*); its head is slightly pubescent. The bluish specimens differ from the description of *D. caerulea* in the colour of the clypeus and legs, and in the punctures of the prothorax.

DITROPIDUS SOLITUS sp. nov.

♂ Black with a bronzy gloss, basal half of antennae reddish, the apical half infuscated or black, labrum and basal half of front femora obscurely reddish. Head, under surface, and legs with sparse pubescence.

Head with dense punctures at base and on clypeus. Eyes large and close together. *Prothorax* as wide at apex as along the middle, with fairly dense and rather small but sharply defined punctures in middle, becoming larger but not confluent on sides. *Elytra* subquadrate; with rows of rather large punctures, becoming larger and set in deep striae on the sides; interstices with very minute punctures. Front legs slightly longer than hind ones. Length (♀♂), 2.2-2.5 mm.

♀ Differs in being more robust, elytra less narrowed posteriorly, and with smaller seriate punctures, front legs no longer than hind ones, and abdomen foveate.

Hab.—South Australia: Mount Lofty (S. H. Curnow, A. H. Elston, and J. G. O. Tepper); New Mecklenburg and Adelaide (Tepper); Moonta and Kilkerran (Blackburn's collection No. 1318); Parachilna (Natural History Expedition, 1917); Quorn (Elston). Victoria: Dividing Range (Blackburn). New South Wales: Sydney (Dr. E. W. Ferguson and A. M. Lea); Forest Reefs (Lea).—Type, *I. 10846* in South Australian Museum; cotype, *C/2318* in Queensland Museum.

A feebly metallic species, with eyes close together, those of the male being separated slightly less than the length of the basal joint of antennæ, in the female about equal to that of the two basal joints; on many specimens the bronzy gloss is hardly in evidence, on some the prothorax has a distinct coppery gloss; the front legs are often entirely dark, and occasionally the labrum is conspicuously red. The punctures at the apex of the prothorax are sometimes almost as coarse as those on the sides; the metasternum is shining, and with sparse, sharply defined punctures in the middle, but the sides appear shagreened, owing to the dense and somewhat asperate punctures there. It is close to *D. quadratipennis*, but is smaller, less metallic, with smaller punctures and interocular space not quite the same; also about the size of *D. odewahni*, but with coarser punctures, darker legs, and eyes much closer together.

DITROPIDUS TROPICUS sp. nov.

♂ Black, basal half of antennæ and sides of labrum reddish. Head, under surface, and legs with sparse white pubescence.

Head with rather dense partially concealed punctures, median line rather distinct. Eyes rather close together. *Prothorax* not twice as wide as the median length, sides strongly rounded; with dense and sharply defined but not very large punctures, becoming larger but not confluent on sides. *Elytra* subquadrate: with series of rather large punctures, on the sides set in deep striae, the interstices between which are costiform posteriorly, the other interstices impunctate or almost so. Front legs scarcely longer than hind ones. (Length (♂ ♀), 2.3 mm.

♀ Differs in being more robust, elytra less narrowed posteriorly, and with smaller punctures, legs slightly shorter and thinner, and abdomen foveate.

Hab.—North-west Australia (Blackburn's collection); Roebuck Bay (H. H. D. Griffith, his No. 3304, and C. French). Queensland: Thursday Island (G. E. Bryant); Cairns (E. Allen); Bowen (Aug. Simson, his No. 88).—Type, I. 10903 in South Australian Museum; cotype, C/2319 in Queensland Museum.

A feebly metallic species, that appears to occur in abundance at Roebuck Bay; the upper surface usually has a vague bluish gloss, the prothorax, especially in the females, occasionally has a faint coppery one. The distance between the eyes of the male is slightly more than the length of the basal joint of antennæ, in the female it is about one half more; the female is usually larger than the male. It is very close to *D. solitus*, but the eyes are not quite so close together, sex for sex, the eyes of the male being about as far apart as those of the female of that species, the prothoracic punctures are somewhat different, and those of the metasternum are larger and more sharply defined on the sides: in general appearance it is like *D. striatopunctatus* but the sides of the prothorax are nonstrigose; from *D. lobicollis* it differs in being smaller, eyes of male slightly closer together, and prothoracic punctures more sharply defined in the middle;

it is also smaller than *D. quadratipennis*, much less metallic, and prothoracic punctures differ; *D. pygidialis* has much smaller punctures on head and prothorax, and eyes more widely separated.

DITROPIDUS VICARIUS sp. nov.

♂ Black, upper surface bronzy or coppery bronze, basal half of antennæ obscurely reddish. Glabrous.

Head shagreened, and with fairly dense but feeble punctures; median line vaguely impressed. Eyes rather widely separated. *Prothorax* about thrice as wide as the median length, sides strongly rounded; punctures fairly dense and rather sharply defined but small, becoming still smaller on sides. *Elytra* rather short; with rows of very small punctures, becoming larger and set in moderately deep striæ on the sides. Length (♂ ♀), 1.5-2 mm.

♀ Differs in the usual particulars of the eyes, legs, and abdomen.

Hab.—North Queensland (Blackburn's collection); Cairns (E. Allen). New South Wales: National Park and Ourimbah (G. E. Bryant); Sydney (A. M. Lea).—Type, *I. 10865* in South Australian Museum; cotype, *C/2320* in Queensland Museum.

Slightly narrower and more metallic than *D. rotundiformis*, prothoracic punctures decidedly smaller and those of sterna different; the intercoxal process of the prosternum has a few punctures in front, that of the mesosternum has a distinct transverse row, but the middle of the metasternum is impunctate. The prothorax could hardly be regarded as shagreened, although at first glance it appears to be so; on some of the specimens, from New South Wales, the pale joints of the antennæ are almost flavous.

DITROPIDUS VAGANS sp. nov.

♂ Black, sometimes with a slight bronzy gloss, basal half of antennæ flavous, the other infuscated, front legs partly or entirely pale, labrum and tarsi more or less obscurely diluted with red. Glabrous.

Head shagreened and with very minute punctures, median line scarcely traceable. *Prothorax* shagreened and with minute punctures. *Scutellum* narrow and distinct. Length (♂ ♀), 1.25-1.5 mm.

♀ Differs in the usual particulars of the eyes, legs, and abdomen.

Hab.—Northern Territory: Darwin, on Acacia flowers (G. F. Hill, No. 371). Queensland: Cairns, Charters Towers (Blackburn's collection); Brisbane (E. M. Hockings). New South Wales: Blue Mountains (Blackburn); Wentworth Falls (Simson's collection); Sydney (Dr. E. W. Ferguson and A. M. Lea); Galston, Como, and Windsor (Lea). South Australia: Port Lincoln (Blackburn and Lea); Murray Bridge (Lea); Quorn (A. H. Elston).—Type, *I. 10875* in South Australian Museum; cotype, *C/2321* in Queensland Museum.

The outlines, eyes, and punctures of sterna are as described in the preceding species, but it is less metallic, the prothorax as well as the head is shagreened, and the seriate punctures on the elytra are different; they are small, narrow, and so close together that the elytra might fairly be regarded as striated throughout; on the sides, however, the striae are deep and well-defined as on most species of the genus. In general appearance it is somewhat like large specimens of *D. punctulum*, but is more oblong, scutellum narrower and more distinct, prothorax less opaque, although shagreened, and with more distinct punctures, and parts of front legs pale; these are sometimes entirely flavous, or at least decidedly paler than the others; occasionally the knees are infuscated and sometimes the femora are entirely dark; on one specimen from Cairns all the tibiae are pale. The punctures on the prothorax, although minute, are sufficiently distinct on close examination, but on the head they are almost invisible.

Var. DUBIUS var. nov.

Some specimens (sexes) are structurally so close to this species that I have not ventured to give them more than a varietal name. They differ in being slightly more rounded, prothorax with scarcely visible punctures, and polished but becoming subopaque on sides; the legs are all black, or at least very obscure.

Hab.—New South Wales: Sydney (W. du Boulay and G. E. Bryant); Illawarra (Bryant); Hornsby (C. Gibbons).

DITROPIDUS BREVICOLLIS sp. nov.

♂ Black; head, antennae (club infuscated), palpi, and legs more or less flavous. Glabrous.

Head subopaque and with scarcely visible punctures, median line very feeble. Eyes close together. *Prothorax* more than thrice as wide as the median length, sides strongly rounded; punctures minute. *Elytra* about as long as the basal width; with rows of distinct punctures, becoming smaller posteriorly, and on the sides set in deep striae. Length (♂♀), 1.75-2 mm.

♀ Differs in being more robust, infuscation of head extended to cover clypeus, elytra less narrowed posteriorly, and abdomen foveate.

Hab.—North Queensland (Blackburn's collection); Cairns district (A. M. Lea).—Type, *I. 10866* in South Australian Museum; cotype, *C/2322* in Queensland Museum.

The eyes are closer together than in any of the preceding small species; the distance between them in the male is slightly less than the length of the basal joint of antennae, in the female it is slightly more. From *D. vicarius* it differs also in being non-metallic, prothoracic punctures smaller and legs paler; from *D. tranquillus* in having the head opaque, and lateral striae of elytra deeper. The legs are often entirely pale, but frequently the hind femora, and sometimes the middle ones as well, are deeply infuscated. Some specimens,

from Cairns. differ in having scarcely visible prothoracic punctures, and legs more brightly flavous. A female, from Mount Tambourine, possibly belongs to the species, but differs from normal females in having slightly larger punctures on prothorax (although still small), and legs black, with the tarsi brown.

Var. ?—Twelve specimens (Northern Queensland and Bundaberg, Blackburn's collection; Cairns district, F. P. Dodd; and Kuranda, H. Hacker) are so extremely close in general appearance to this species (they even differ sexually in the colour of the head), that it seems undesirable to name them as distinct, but they certainly have the eyes more distant, those of the male being as widely separated as in the female of the typical form, and those of the female about one-third more than in its female; placing specimens side by side, the differences are at once apparent. One male has the prothorax reddish, with its middle infuscated.

DITROPIDUS OPACICEPS sp. nov.

♂ Black; clypeus, labrum, basal half of antennæ, palpi, and parts of legs, more or less obscurely flavous or reddish. Glabrous.

Head shagreened and with very minute punctures; median line feeble. Eyes rather widely separated. *Prothorax* about thrice as wide as the median length, sides strongly rounded; punctures sparse and minute. *Elytra* subquadrate; with rows of fairly distinct punctures, becoming smaller posteriorly and on the sides set in fairly deep striae. Length, (♂ ♀), 1.75-2 mm.

♀ Differs in being more robust, clypeus darker than labrum, and in the usual particulars of the eyes, legs, and abdomen.

Hab.—New South Wales: Sydney, Galston, Como. Queensland: Mount Tambourine (A. M. Lea); Dalby (Mrs. F. H. Hobler); Bribie Island (H. Hacker and Lea)—Type, *I. 10930* in South Australian Museum; cotype, *C/2333* in Queensland Museum.

The outlines and general appearance are almost as in the preceding species, but the prothorax is almost—on some specimens quite—impunctate, and the distance between the eyes, sex for sex, is about twice as great; the prothorax and shagreened head readily distinguish the species from *D. tranquillus*. The legs are sometimes entirely pale, but usually the femora, or at least the hind ones, are deeply infuscated; the head could hardly be regarded as reddish, but it is not of the deep shining black of the prothorax. The prosternum and metasternum are fairly densely punctate in the middle, the metasternum is shining and sparsely punctate there. The distance between the eyes of the male is about equal to the length of the five basal joints of antennæ; in the female it is about one-fourth more. The only specimen from Mount Tambourine has darker legs than usual, and the middle of its labrum is infuscated.

GELOPTERA TETRASPILOTA Lea.

A specimen of this species, from the Queensland National Park, has an infuscate spot on the suture between the two large median spots, and these are almost connected with the sides.

EDUSA DECEMLINEATA sp. nov.

♀ Dull coppery bronze, elytra somewhat purplish, under surface more shining; labrum, basal half of antennae, basal joints of palpi, and parts of legs reddish. Densely clothed with short, ashen or white pubescence, on the elytra forming ten distinct lines.

Head shagreened and with minute punctures, distinct only on front of clypeus, median line feebly impressed and confined to basal half. *Antennae* long and thin. *Prothorax* shagreened and indistinctly punctate. *Elytra* densely and finely granulate-punctate, with larger, but not confluent, punctures scattered about, and forming geminate rows. *Femora* stout, front pair acutely dentate. Length, 5.25-5.75 mm.

Hab.—New South Wales: Dorrigo (Dr. R. J. Tillyard).—Type, C/2324 in Queensland Museum; cotype, I. 1190 in South Australian Museum.

There are ten well-defined lines of pale pubescence on the elytra, each line bounded by geminate rows of punctures; the tip of the clypeus and a small space near each antenna are metallic green. To associate the species with others in my table¹⁰ a new section would be required, as it could hardly be placed in F, as the elytra are conspicuously striped, and as they are without longer hairs it could not be referred to FF.

COLASPOIDES FASCICULATA sp. nov.

♂ Testaceous with a conspicuous brassy-green gloss; under surface, antennae, palpi, and legs paler and not metallic; tips of seventh, eighth, and eleventh joints of antennae infuscated.

Head with fairly dense but unevenly distributed punctures; with a shallow median line. Third joint of antennae distinctly shorter than fourth. *Prothorax* about twice as wide as long, sides evenly rounded, all angles dentate; middle with rather sparse punctures, somewhat larger than those on head, but becoming larger and denser on sides. *Scutellum* impunctate. *Elytra* rather elongate, parallel-sided to beyond middle, with rather dense and fairly large punctures about base, more crowded and transversely confluent behind shoulders, much smaller and seriatly arranged posteriorly. *Abdomen* shallowly depressed, with long straggling hairs, fourth segment carinated along middle, fifth irregularly impressed. *Legs* rather long, front femora stout and acutely dentate; basal joint of front and of middle tarsi large and slightly concave on lower surface; hind tibiae rather thin and longer than the others, gently emarginate on lower surface near apex, a loose fascicle before the emargination, tip with a long curved fascicle; basal joint of hind tarsi shorter than the rest combined. Length (♂ ♀), 7.7-5 mm.

♀ Differs in being less elongate, abdomen simple, legs shorter, hind tibiae simple, and basal joint of front and middle tarsi shorter, and much thinner.

¹⁰ Lea, Trans. Roy. Soc. S. Aust., 1915, p. 193.

Hab.—Queensland: Blackall Range.—Type, male and female, C/2325 in Queensland Museum; cotype, male, in South Australian Museum.

With the general outlines and appearance of *C. tarsalis* and *C. picticornis*, with which it would be associated in my table,¹¹ but readily distinguished from those and all other described species by the shape and clothing of the hind tibiae of the male; the third-sixth joints of antennae of the male have some rather long hairs on the under surface; the tips of the antennae of the female are missing, and only its eighth joint is infuscated.

MACROGONUS QUADRIVITTATUS Jec.

Of sixteen specimens of this species before me five have the elytra purple or blue, except that the margins and suture are narrowly flavous; on the others the blue (sometimes almost black) part of each elytron is divided into two by a flavous vitta, the vitta narrow and hardly passing the middle on some specimens, wider and almost touching the apex on others; on twelve the basal spot of the head is divided by a narrow longitudinal vitta, on the others the spot is divided into four parts, each of which is hardly more than a stain.

MACROGONUS BIFOVEICOLLIS sp. nov.

♂ Flavous, elytra dark blue or greenish blue, tarsi coppery green, second to fifth joints of antennae metallic blue or coppery green, the following ones opaque purple, tips of mandibles blackish.

Head with a fairly deep interocular impression, connected with the base by a distinct median line; punctures sparse, irregular, and mostly small. *Prothorax* about twice as wide as long, each side with a large obtuse median tooth, front and hind angles slightly armed, between median and hind teeth a deep notch; with a large, somewhat transverse, deep fovea on each side of middle; punctures sparse and rather small, but sharply defined. *Scutellum* triangular, slightly longer than wide. *Elytra* much wider than base of prothorax; each with four irregular foveae: two on the sides behind the shoulder, one halfway between the front one of these and the suture, the other slightly nearer the second marginal fovea than the suture; with regular rows of rather small punctures. Length (♂ ♀), 10.5-11.5 mm.

♀ Differs in having the prothorax smaller and less transverse, sides gently rounded and unarmed in middle, notch near hind angles less pronounced, disc nonfoveate, and with slightly larger punctures; elytra with lateral foveae not traceable, and the others smaller, antennae and legs slightly shorter and thinner, and knees and most of tibiae dark.

Hab.—Queensland: Mount Tambourine (H. Hacker, Nos. 741 and 742, R. Illidge, and A. M. Lea).—Type, I. 4771 in South Australian Museum; cotype, C/2326 in Queensland Museum.

¹¹ Lea, Trans. Roy. Soc. S. Aust., 1915, p. 279.

Of four males before me three have most of the abdomen infuscated, but on the other, and on four females, it is no darker than the rest of the under surface. The medio-lateral tooth on the prothorax of the male is somewhat larger but less acute than on *M. quadrivittatus*; the male is unmistakably a *Macrogonus*, but I am unable to point out how the female may be distinguished from *Macrolema*.

FAMILY EROTYLIDÆ.

LANGURIA ALBERTISI Her.

L. vulgaris Har.

L. vandepolli Fowler.

L. australis Mael.

The species of *Languria* so abundant in the Cairns district (it occurs also at Bowen, Cooktown, and Melville Island, and there are specimens in the South Australian Museum from the Madang district of New Guinea, and from Aru) has the head and prothorax red, and elytra black, with a bluish or purplish gloss; the antennæ and legs are black and the mesosternum, metasternum, and abdomen are black or deeply infuscated; this is the most common form, and has been named *vulgaris*, *vandepolli*, and *australis*. On 28 specimens before me the under surface is red, and the legs and antennæ partly red, agreeing with the form named *albertisi*; the differences are probably due to immaturity, as the two forms occur freely together, and there are others before me in which the normally black parts are infuscated in varying degrees. The eighth joint of the antennæ is slightly larger than the seventh, but distinctly smaller than the ninth; on the males being produced slightly to one side, it might fairly be regarded as part of the club, but on the females it evidently could not be so regarded; in *albertisi* the club was described as three-jointed, and in *vulgaris* as four-jointed, but I believe these names to belong to but one species. Blackburn has already noted *vandepolli* as a synonym of *vulgaris*, and *australis* has now to be noted as another. The size ranges 2.4-5 mm.

In Wytzman's Genera Insectorum, Fasc. 78, in which the Langurides are dealt with by Fowler, *albertisi* was referred to *Stenodastus*, *vulgaris* to *Cœnolanguria*, *vandepolli* to *Anadastus*, and *australis* was overlooked. Of the other species recorded from Australia *L. militaris* has the suture reddish (of 121 specimens of *albertisi* before me not one has the suture reddish), and *L. picea* has the head and prothorax nigropiceous (several specimens of *albertisi* have the head infuscated at base).

EPISCAPHULA OPACA Crotch.

A remarkably distinct species, the curved red mark on each shoulder is sometimes entire, but is usually broken up into two parts; on one specimen the markings are reduced to a dull spot on the shoulder, and another near apex of each elytron, the spots so dark that, to the naked eye, the upper surface appears entirely black. Specimens before me are all from Queensland: Cairns, Port Curtis, Bowen, and Bluff.

EPISCAPHULA BIFASCIATA MacL.

Macleay described the elytra of this species as "finely striate-punctate"; on the flavous fasciæ (these become reddish with age) the series of punctures, through "waterlogging," sometimes appear as fairly distinct, but they are really so small that where not waterlogged they are scarcely visible. There is a specimen of the species, from Aru, in the South Australian Museum, with the prothoracic spots smaller than usual, but in other respects agreeing well with typical specimens from Cairns.

EPISCAPHULA AUSTRALIS Boi.

E. froggatti MacL., var.

On the typical and common form of *E. australis* the elytra, as described by Boisduval, have nine black spots: three basal, three antemedian, two postmedian, and one apical; but in a fairly common variety named *froggatti* by Macleay, and figured by Kuhnt¹² the antemedian spots are combined to form a zigzag fascia. The series of punctures on some specimens appear to be large and close together, but this is due to "waterlogging"; on examining such specimens from the sides the punctures will be seen to be small and distant, although fairly sharply defined. The species occurs in Northern Territory (including Melville Island), Queensland, New South Wales, Victoria, and Tasmania; and there are also many specimens of the variety *froggatti*, in the South Australian Museum, from the Madang district of New Guinea.

EPISCAPHULA BREVICORNIS Blackb.

I am unable to distinguish this species structurally from the preceding, but the prothoracic and elytral markings are more extended, and on a somewhat different plan. On the prothorax the markings may consist of a large semi-double mediobasal blotch, and an isolated spot on each side, or they may be all conjoined; on the elytra the black markings may be continuous almost to each side, or with a projection from the red portion on each elytron, so that a large black square or oblong is isolated on each shoulder, the two large black subapical spots may be completely isolated, or conjoined across the suture.

EPISCAPHULA FLAVOFASCIATA sp. nov.

Black, with flavous or reddish-flavous markings.

Head with rather dense but very small punctures. *Antennæ* with third joint twice as long as fourth. *Prothorax* about twice as wide as long, sides oblique, front angles acute and each with a puncture, a vague basal depression on each side of middle; with small punctures much as on head, and a few of larger size scattered about. *Elytra* with minute punctures; sutural striæ distinct only on apical third. *Abdomen* with inconspicuous coxal lines. Length, 7-10 mm.

¹² Kuhnt in Wytzman's *Genera Insectorum*, Fasc, 88, pl. iv, fig. 11.

Hab.—Queensland: Brisbane (R. Illidge); Mapleton; National Park (H. Hacker). New South Wales: Dorrigo (R. J. Tillyard and W. Heron); Richmond River (A. M. Lea).—Type, *I*, 11767 in South Australian Museum; cotype, *C*/2327 in Queensland Museum.

The markings are slightly variable, but on the types the prothorax is pale, with three large spots occupying the basal half, except for oblique lines between them and the sides, the median spot is more than twice the size of the others; the elytra have an irregular pale fascia at the basal third, touching neither suture nor sides, and another at the apical third, not quite touching the suture, continued around the sides and apex till the two parts are interrupted at the suture (on some specimens the fascia has a narrow extension on each side of the suture, so that two large black spots are isolated); the prosternum is flavous, and part of the abdomen obscurely diluted with red; parts of the legs are also obscurely reddish. Some of the specimens have the dark parts hardly more than castaneous, and on one such specimen the lateral spots of the prothorax appear as feeble infuscations. The punctures at the base of the head are larger than those in front, but are usually concealed by the overlapping prothorax; the elytra from some directions appear to have feeble rows of minute punctures, but from most directions the punctures are almost or quite invisible. At first glance the species appears close to *E. foveicollis*, but the head has much smaller punctures, the larger ones of the prothorax are mostly basal, and certainly not congested in the front angles, the outer spots are basal instead of median, the black basal marking of the elytra is continuous from side to side, instead of twice interrupted to the base, and the apical markings are different. It is also close to *E. bifasciata*, but with three basal dark spots on the prothorax instead of two, and the front angles less acute. In general appearance some of the specimens look like large ones of *E. brevicornis*, but may be at once distinguished by the longer third joint of antennæ.

EPISCAPHULA INCLUSA sp. nov.

Black, upper surface blackish purple or blackish blue; a large red mark on each elytron, commencing at the base, and almost touching the scutellum and shoulder, curved round so as almost to touch the side of the basal third, and then directed to the suture, which it almost touches just beyond the middle; parts of under surface and of tarsi reddish.

Head with fairly numerous, sharply defined, but not very large punctures; clypeal suture distinct but not deeply impressed. Third joint of antennæ twice the length of fourth. *Prothorax* at base more than twice as wide as the median length, sides diminishing in width to apex, front angles produced but not very acute, submarginal line deep from base to apex; punctures sparser and mostly smaller than on head, a few slightly larger ones in a feeble depression on each side of base. *Elytra* slightly dilated from shoulders to basal fourth; with regular rows of distinct, but not very large punctures, the interstices with much smaller ones. Coxal lines of *abdomen* well defined almost to apex. Length, 6.8 mm.

Hab.—Queensland (National Museum); Cairns (E. Allen and A. P. Dodd); Mapleton (H. Hacker). Type, *I. 11774* in South Australian Museum; cotypes, *C/2328* in Queensland and National Museums.

On several of the specimens the head and shoulders have a slight metallic-green gloss; to the naked eye the red markings of the elytra appear to be almost circular, they almost completely enclose a dark space about the size of the prothorax; on most of them the abdomen is paler than the rest of the under surface, and on several each segment, except the basal one, is darker at its extreme base and apex, so that the middle appears obscurely fasciate; on several the large apical joint of the palpi is conspicuously reddish. The species is wider than usual, and the elytral markings are very different from those of any previously named Australian one.

THALLIS PERPLEXA Blackb.

Numerous specimens from Cairns, Cooktown, Coen River, and Darnley Island, and one from Manumba in the Madang district of New Guinea, agree with the description of this species; which is possibly also *T. bizonata*, but that species was described as having the prothorax "very finely punctate" and the elytra as "very faintly striate-punctate"; on the specimens before me the prothoracic punctures are of moderate size and sharply defined, and the series of punctures on the elytra are larger than usual, and sharply defined even to the apex.

THALLIS MACLEAYI Blackb.

Readily distinguished from several somewhat similarly coloured species by the wide prothoracic margins, the spots close to the suture vary somewhat in intensity of colour; it occurs in Queensland (Brisbane and Bowen), Northern Territory (Darwin), and North-west Australia (Derby and Port George IV).

THALLIS INSUETA Crotch.

The four large spots, on the elytra of this species, vary somewhat in size and intensity, but are always conspicuous. The species occurs in Queensland, New South Wales, Victoria, Tasmania, and South Australia.

THALLIS AUSTRALIÆ sp. nov.

Dark castaneous brown, elytra with two reddish fasciæ. Densely clothed with dark pubescence, becoming almost golden on the fasciæ, in addition with numerous sub-erect hairs; under surface and legs with almost white pubescence.

Head sub-opaque, and with crowded but sharply defined punctures. *Antennæ* rather short, second to eighth joints sub-equal. *Prothorax* not twice as wide as long, sides gently rounded and slightly uneven: punctures much as on head. *Elytra* no wider than widest part of prothorax, parallel-sided to near apex; with regular rows of fairly large punctures, the interstices with numerous

small ones. *Prosternum* with rather coarse punctures on sides, across middle some of them transversely confluent, intercoxal process small and almost parallel-sided. *Abdomen* with coxal lines obscured by clothing. Length, 4.5 mm.

Hab.—Queensland: Cunnamulla (H. Hardeastle); Bowen (Aug. Simson, No. 554); Dalby (Mrs. F. H. Hobler). New South Wales: Narromine (Dr. E. W. Ferguson); Condobolin (H. J. Carter from — Halligan); Belltrees (S. Jackson); Albury (A. M. Lea). South Australia: Adelaide. North-west Australia: Derby (W. D. Dodd).—Type, *I. 12006* in South Australian Museum; cotype, *C/2329* in Queensland Museum.

Similar in size to and densely pubescent like *T. erichsoni*, but without a small red spot on each side of the apex, and hence the pale markings of the elytra in two series only (constant on twenty-eight specimens), the dark median fasciae considerably wider, and not zigzagged, and the punctures somewhat stronger. Of the pale fasciae the first occupies the basal two-fifths of the elytra, except for a large subquadrate patch adjacent to the scutellum (the spot is sometimes rather feebly infuscated), the second is at the apical third, the part on each elytron is convex on its anterior margin, concave on its posterior and narrowed to the suture; the under surface and legs are somewhat paler than the head and prothorax. Two of the specimens from Derby have the dark parts black; on a few of the Queensland ones they are almost black.

THALLIS MELANCHOLICA sp. nov.

Black; legs, antennae, and palpi more or less reddish; abdomen obscurely diluted with red. Rather densely clothed with sub-erect, rusty pubescence.

Head with dense and fairly large punctures. *Antennae* with fourth joint about two-thirds the length of third, and slightly longer than fifth. *Prothorax* about once and two-thirds as wide as long, apex truncate in middle, and notched near each side, sides slightly and irregularly serrated, a rather deep line near each side; punctures slightly larger than on head, becoming smaller and denser in front. *Elytra* parallel-sided to near apex, with regular rows of fairly large punctures, becoming smaller posteriorly; interstices with numerous distinct but rather small punctures. Intercoxal process of *prosternum* moderately wide, obtusely pointed. *Abdomen* with coxal lines traceable to beyond middle of basal segment. Inner edge of front *tibiae* minutely serrated. Length, 7.9 mm.

Hab.—Queensland: Mount Tambourine (A. M. Lea). New South Wales: Blue Mountains (Dr. E. W. Ferguson); Mount Wilson, Eden (H. J. Carter); Galston (D. Dumbrell and Lea); Sydney (J. J. Walker and Lea). Tasmania (Aug. Simson, No. 3825); Hobart (Lea).—Type, *I. 12009* in South Australian Museum; cotype, *C/2330* in Queensland Museum.

Although the derm of the majority of the specimens is of a shining black, it appears, to the naked eye, more or less dark rusty brown, owing to the pubescence; some of the specimens, however, are really rusty brown with the abdomen paler,

but this is probably due to immaturity. The prosternum and outlines are much as in *T. insueta* and *T. venustula*. One of Mr. Carter's specimens was labelled as from West Australia.

EUXESTUS VULNERATUS sp. nov.

Black, a large basal patch on elytra red, muzzle and under surface castaneous, legs and antennæ flavous. Upper surface with sparse, sub-erect pubescence.

Head evenly convex; with small but sharply defined punctures; a shallow depression on each side of clypeal suture. *Antennæ* short, club large, slightly wider than long. *Prothorax* at base about thrice as wide as the median length, base bisinuate, apex evenly incurved to middle, margins very narrow, punctures as on head. *Elytra* with outlines continuous with those of prothorax, widest at about basal third; with rows of small punctures. *Abdomen* with coxal lines traceable to near apex of basal segment. Length, 1.75-2 mm.

Hab.—Queensland: Little Mulgrave River (H. Haacker); Cairns (C. J. Wild).—Type, *I. 12015* in South Australian Museum; cotype, *C. 2331* in Queensland Museum.

A briefly elliptic, strongly convex species, very distinct by a large blood-red patch on the elytra; it covers part of the base (leaving a rather narrow strip of black on each side), then extends rather narrowly to each side, from there its margin extends obliquely towards the suture, and then is truncated across the suture itself, at the middle (on some specimens its posterior margin is rounded); the tips of the elytra are usually obscurely diluted with red, and the dark parts sometimes have a coppery gloss. On one specimen the large patch is flavous, and the apex of the elytra is conspicuously pale. The clothing of the upper surface appears to be easily abraded, as several of the specimens are now almost glabrous. The elytral punctures are all small, but are fairly distinct on the paler parts.

EUXESTUS BIVULNERATUS sp. nov.

Black, a large blood-red spot on each shoulder, legs, antennæ, palpi, and elytral epipleuræ reddish flavous. Glabrous. Length, 2.2-2.5 mm.

Hab.—Queensland: Mount Tambourine (A. M. Lea).—Type, *I. 11784* in South Australian Museum; cotype, *C. 2342* in Queensland Museum.

Structurally extremely close to the preceding species, but slightly larger, elytral markings, which are of the same blood-red colour, extending from each side to about one-third from the suture, so as to resemble an interrupted fascia; clypeal impressions deeper and punctures smaller, especially on the prothorax and elytra. The dark parts of the upper surface, on ten specimens, are deep polished black, but on another they have a slight coppery gloss; the extreme tips of the elytra are sometimes obscurely diluted with red. The coxal lines are distinct, and enclose a plate on each side, but these are without punctures.

Var.—A specimen, from Wollongong, possibly belongs to this species, but has the elytral markings smaller and much less distinct, appearing as a rather obscure spot on each shoulder.

EUXESTUS PARKI Woll.

Black; head, tips of prothorax, elytra, and under surface (except metasternum) more or less obscurely castaneous; legs, antennæ, and palpi paler. Glabrous.

Head with rather dense and small, but sharply defined punctures; a small fovea on each side of clypeus. *Antennæ* short; club large, slightly wider than long. *Prothorax* not thrice as wide as the median length, base feebly bisinuate, apex almost straight, margins very narrow; punctures rather less dense, but otherwise as on head. *Elytra* with outlines continuous with those of prothorax; with feeble rows of small punctures; interstices with punctures as on prothorax. *Abdomen* with coxal lines inconspicuous. Length, 1.75-2 mm.

Hab.—Queensland: Mulgrave River (H. Hacker); Cairns (A. M. Lea).

More evenly elliptic and slightly less convex than either of the preceding species, and about one-fourth narrower in proportion; at first glance it resembles several species of *Paracymus* and other small Hydrophilidæ. On several specimens the elytra are obscurely diluted with red about the extreme tips, but on a few the red almost covers the apical third, although not sharply limited.

A specimen from New Ireland (Edgar R. Waite) is a trifle larger than Queensland specimens, but I can find no other distinctions.

DIPLOCÆLUS MAXIMUS sp. nov.

Blackish brown; legs, antennæ, and palpi obscurely reddish. Moderately clothed with short, depressed pubescence, becoming denser and paler on under surface; upper surface, in addition, with moderately long, erect, reddish setæ.

Head with fairly numerous moderate and small punctures; a deeply impressed transverse line near base. *Antennæ* rather short; club three-jointed, apical joint about once and one-half the length of ninth or tenth. *Prothorax* about twice as wide as long, sides evenly rounded with margin thickened, hind angles rectangular, front angles acute and produced, rest of apex straight, each side with three impressed lines, the outer continuous and within the thickened margin, the next continuous, the other shallow in front, interrupted in middle, and deep and wide at base, near base with a deeply impressed sinuous line, with a short median projection; punctures sharply defined and somewhat sparser than on head, except on margins, where they are crowded. *Elytra* almost parallel-sided to near apex; with rows of fairly large, sub-oblong punctures, becoming smaller and rounded towards suture and posteriorly; interstices each with a row of distinct punctures, and with smaller ones scattered about. Length, 8.9 mm.

Hab.—Queensland: Cairns district (H. Hacker and A. M. Lea).—Type, *I. 11787* in South Australian Museum; cotype, *C/2076* in Queensland Museum.

Close to *D. leai*, but distinctly larger, less hairy, and as a result the punctures appear more distinct and the derm shinier, with the median line of the prothorax not traceable throughout, but represented by a short impression joining the basal line. The setæ on the elytra, when viewed from behind or in front, are seen to be in regular lines, rows of longer ones on the interstices alternating with somewhat shorter ones set in the seriate punctures.

DIPLOCCELUS SERICEUS sp. nov.

Blackish; legs, antennæ, and palpi obscurely reddish. Densely clothed with short, depressed, brownish or greyish sericeous pubescence; upper surface, in addition, with dense, fairly long, erect, reddish setæ.

Head with fairly large but partially concealed punctures, a transverse impressed line at base. Antennæ slightly passing base of prothorax; club three-jointed, apical joint almost as long as the two preceding combined. *Prothorax* about twice as wide as long, sides strongly rounded, front angles produced, rest of apex straight, with three deep somewhat curved lines on each side, a deeper and somewhat sinuous line across base; punctures minute, and more or less concealed. *Elytra* with sides gently rounded, widest at about basal third; with rows of fairly large, sub-oblong punctures, becoming much smaller and rounded near suture; interstices with minute punctures. Length, 7.7-7.5 mm.

Hab.—Queensland: Coen River (W. D. Dodd); Cairns district (A. M. Lea).—Type, *I. 11788* in South Australian Museum; cotype, *C/2075* in Queensland Museum.

About the size and shape of *D. leai*, but with very different clothing; the elytra have a curious mottled appearance, owing to numerous sericeous-looking patches, which alter their positions with the point of view: the arrangement of the elytral setæ is much as on the preceding species, but the pubescence is different, and the punctures are much smaller; from the prothorax, owing to the denser pubescence, they appear at first to be absent; the transverse basal line of the prothorax is also without a median projection.

Vars. ?—Two other specimens, from Cairns, probably belong to this species; they have the setæ on the upper surface much denser than on the typical form, scarcely half their length, and not at all seriate in arrangement; the pubescence has a mottled appearance, but on one of them is even denser than on the types, and on the other sparser, with the result that on one the derm appears to be sub-opaque, and on the other more polished.

DIPLOCCELUS DILATATICOLLIS sp. nov.

Dull reddish brown or castaneous, appendages slightly paler. Densely clothed with short, depressed pubescence, denser and paler on under surface than on upper, the latter in addition with lines of short, semi-erect setæ.

Head with dense and rather small punctures; a shallow depression on each side of clypeus. Antennæ short; club three-jointed. *Prothorax* more than

thrice as wide as long, base and apex subequal, front angles slightly produced, sides strongly and evenly rounded: with ten longitudinal elevations, of which those near the sides are fairly distinct and continuous, the median ones less distinct, and almost disappearing near base; punctures dense and small. *Elytra* parallel-sided to near apex; with rows of fairly large punctures, becoming smaller towards suture; interstices with small punctures. Length, 3.3-25 mm.

Hab.—Queensland: Mount Tambourine (C. J. Wild and A. M. Lea).—Type, *I. 11791* in South Australian Museum; cotype, *C/2078* in Queensland Museum.

The sides of the prothorax are dilated so that their greatest width is slightly, but distinctly, more than that of the elytra, a character that at once distinguishes the species from *D. decemlineatus*, and from *D. fasciatus* (on some specimens of the latter the elytral markings are very feeble); from *D. latus*, which has somewhat similar prothoracic sides, it is distinguished by the much smaller punctures of the entire upper surface. On several specimens there is a slight infuscation about the middle of the elytra.

FAMILY ENDOMYCHIDÆ.

IDIOPHYES BREVIS Blackburn.

The type and only specimen of this species known to Blackburn is now in the British Museum, but numerous specimens before me appear to belong to the species, which at first glance seems to be a minute *Stenotarsus* (except for its shorter and entirely pale antennæ it resembles *S. pisoniæ* in miniature). In the generic diagnosis Blackburn stated "prosternum inter coxas sat angustum, postice vix productum," but later "I cannot satisfy myself as to whether its prosternum projects slightly or not at all clear of the front coxæ." Examining unset specimens it is difficult to see the end of the intercoxal process clearly, but on removing the prothorax from the hind body the intercoxal process appears rather acute, produced beyond the coxæ, with a notch in the mesoternum for its reception. Arrow states¹³ that it belongs to the genus *Eryasma*, of which Csiki in the Catalogue of Endomychidæ records species only from America; as the genus was first recorded from Central America by Gorham,¹⁴ and two of the species figured¹⁵ are very different in appearance from the Australian ones, I prefer to retain the name *Idiophyes* for the latter.

Hab.—Queensland: Brisbane (many specimens from wattle blossoms in July); Mulgrave River. New South Wales: Glenfield (many specimens from a nest of termites, *Coptotermes* sp.); Forest Reefs. South Australia: Adelaide (one specimen from a nest of the same species of *Coptotermes*); Kangaroo Island. Tasmania: Kempton.

¹³ Arrow, Trans. Ent. Soc. Lond., 1920, p. 3.

¹⁴ Gorham, Biol. Cent. Amér., Col., vii, p. 145.

¹⁵ *L.c.*, pl. vii, figs. 14 and 15 (*E. orbicularis* and *E. ? tenuicornis*).

STENOTARSUS PISONIÆ sp. nov.

Reddish or castaneo-flavous, antennæ partly black or blackish. Moderately densely clothed with pale upright hair.

Head almost impunctate, with a shallow interocular impression. *Antennæ* short; club rather stout. *Prothorax* widely transverse, sides strongly rounded, apex much narrower than base and semicircularly emarginate, sublateral striae deep, dilated at base: almost impunctate. *Elytra* at base slightly wider than prothorax, sides gently rounded: with regular rows of fairly large punctures, in feeble striae; interstices with small punctures. Length, 3.5-4.5 mm.

Hab.—Queensland: Cairns district (F. P. Dodd, C. J. Wild, and A. M. Lea); Little Mulgrave and Coen Rivers (H. Hacker).—Type, *I. 12024* in South Australian Museum; cotype, *C/2336* in Queensland Museum.

Structurally close to *S. arithmeticus*, but entirely pale except for the antennæ; of these the three terminal joints appear to be always black, the four or five preceding ones vary from blackish to hardly darker than the basal ones. Some of the specimens are paler and some more densely clothed than others, probably due to better preservation. Many of the specimens from Mr. Dodd were trapped by sticky seeds of *Pisonia brunoniana*.

STENOTARSUS PICTICOLLIS sp. nov.

Reddish flavous, three spots on prothorax conjoined at base; scutellum, two large transverse spots on elytra, most of antennæ, and femora black. Length, 3.25-3.5 mm.

Hab.—Queensland: Brisbane (H. Hacker and R. Illidge).—Type, *I. 12025* in South Australian Museum; cotype, *C/2337* in Queensland Museum.

Structurally close to *S. arithmeticus*, but head and two spots on prothorax pale, the blotch on each elytron before the middle not 3-shaped, and without apical spots. It is slightly narrower than the preceding species, but the sculpture and clothing are as noted for it. The dark parts of the prothorax are a large equilateral triangle, and a spot about two-thirds of its size on each side, thus leaving a large pale subtriangular spot on each side of apex; on the elytra the spots are of somewhat irregular shape, and appear like a fascia widely interrupted in middle, and not touching the sides; three or four of the basal joints of antennæ are obscurely diluted with red, and the tibiæ and coxæ are usually deeply infuscated.

STENOTARSUS QUINQUENOTATUS sp. nov.

Red or reddish flavous; a subtriangular spot on prothorax, scutellum, four spots on elytra, antennæ (basal joints obscurely diluted with red), femora, and tibiæ black. Length, 3-3.25 mm.

Hab.—Queensland (Blackburn's collection). New South Wales: Gosford (H. J. Carter); Ourimbah (Dr. E. W. Ferguson); Wollongong, Sydney (A. M. Lea).—Type, *I. 12026* in South Australian Museum; cotype, *C/2338* in Queensland Museum.

Structurally very close to the preceding species, and with similar clothing, but elytral punctures rather less regular, the prothorax with but one dark spot, and the elytra with four placed transversely across the middle, of the latter the inner spots are oblong-elliptic and somewhat larger than the outer ones, which are circular.

FAMILY CORYLOPHIDÆ.

APHANOCEPHALUS BIMACULATUS sp. nov.

Black; elytra with two large, round, red spots before the middle; antennæ (except club), palpi, and tarsi reddish. Upper surface shining and almost glabrous, under finely pubescent.

Head with dense small punctures. *Antennæ* moderately long, first joint stout, ninth forming a one-jointed club. *Prothorax* at base about four times as wide as the median length, sides strongly rounded and finely margined, apex gently incurved to middle and about half the width of base; with fairly dense, minute punctures. *Elytra* with outlines continuous with those of prothorax, and with somewhat stronger margins; with fairly dense and sharply defined punctures, mostly rather small. Length, 2.2-2.5 mm.

Hab.—Queensland: Bowen (Aug. Simson's No. 1556); Mackay (R. E. Turner).—Type, *I. 11800* in South Australian Museum; cotype, *C/2339* in Queensland Museum.

An oblong-elliptic, deep-black species, with two conspicuous red spots on elytra; of the nine specimens before me the elytral spots are alike on all, except for a slight variation in size and sharpness of definition. The punctures on the elytral epipleuræ, sides of metasternum, and basal segment of abdomen are denser and somewhat stronger than on the elytra.

APHANOCEPHALUS QUADRINOTATUS sp. nov.

Black; tarsi and four spots on elytra reddish; antennæ (except club), palpi, parts of tibiæ, and elytral epipleuræ obscurely reddish. Moderately clothed with pale, subdepressed pubescence. Length, 1.75 mm.

Hab.—Queensland: Mount Tambourine, and Cairns district (A. M. Lea).—Type, *I. 11799* in South Australian Museum; cotype, *C/2340* in Queensland Museum.

The shape and margins are as in the preceding species, but the size is smaller, punctures on elytra somewhat larger, those on the basal segment of abdomen and sides of metasternum denser but smaller than on elytra, and those on the elytral epipleuræ still smaller. The first spot on each elytron is larger than the other, curved like an inverted comma, commences near the shoulder, and terminates in the middle about one-fourth from the suture; the second one varies considerably in size and shape, and is placed at the apical third; on one specimen the spots on each elytron are conjoined, on another they are conjoined on the right elytron (so as to appear like an S) but are free on the left.

(ISSUED DECEMBER 19, 1922.)

NOTES AND ILLUSTRATIONS OF QUEENSLAND FISHES, No. 3.

BY ALLAN R. McCULLOCH, ZOOLOGIST, AUSTRALIAN MUSEUM.

(By permission of the Trustees of the Australian Museum.)

(Plate XIV, fig. 1.)

A SMALL collection of fishes from Queensland waters has been submitted to me for examination by the Director of the Queensland Museum. Most of these were obtained by the trawler "Bar-ea-mul" during her investigations on the Queensland coast. They include several species not previously recognised from Australian waters.

FAMILY CLUPEIDÆ.

ILISHA HÆVENNI Bleeker.

Pellona hævenii Bleeker, Verh. Bat. Gen. xxiv, 1852, Haring. p. 21. *Id.* Weber and Beaufort, Fish. Indo-Aust. Arch. ii, 1913, p. 86, fig. 29.

Ilisha hævenii Bleeker, Atlas Ichth. vi, 1872, p. 117, pl. cclxix, fig. 2.

A specimen from Queensland, 163 mm. long, is the first of the genus to be recognised from Australian waters. It is similar to a smaller specimen from Amboyna, which was part of Dr. Bleeker's collection, but differs from his figure in having colourless fins and a dark ill-defined shoulder-spot.

Locality.—Between Cairns and Rockhampton, Queensland.

FAMILY MENIDÆ.

MENE MACULATA Bloch & Schneider.

Mene maculata (Bloch & Schneider) Valenciennes, Règne Anim. Illustr. Poiss., 1843, p. 139, pl. lxii, fig. 2. *Id.* Day, Fish India, 1876, p. 249, pl. 53, fig. 5.

Two specimens, 163 and 172 mm. long, were trawled between Cairns and Rockhampton, Queensland. This monotypic family has not been previously recognised from Australian waters.*

*Editor's Note.—Day's figure of *Mene maculata* has been reproduced from "Fishes of India," pl. 53, to illustrate this new Australian record (Plate xiv, fig. 2).

FAMILY SPARIDÆ.

GENUS ARGYROPS Swainson.

Argyrops Swainson; Nat. Hist. Class. Fish, &c., ii, 1839, p. 221 (*spinifer*).

The similarity of *Argyrops* and *Pagrosomus* Gill has been noted by Jordan and Thompson (Proc. U.S. Nat. Mus. xli, 1912, p. 575). Having compared the genotypes of both genera, I find that they can only be separated by the following characters:—

- a. Two rows of large teeth on each side of the upper jaw, and an inner row of much smaller ones.
 b. Dorsal spines filamentous; depth of the body greater than half its length to the hypural joint *Argyrops*
 bb. Dorsal spines not produced; depth of the body less than half its length to the hypural joint *Pagrosomus*.

ARGYROPS SPINIFER Forskal.

Sparus spinifer Forskal, Descr. Anim., 1775, p. 32. *Id.* Bleeker, Atlas Ichth. viii, 1877, p. 109, pl. 213, fig. 3.

Pagrus spinifer Day, Fish. India, 1875, p. 138, pl. xxxiii, fig. 5. *Id.* Kent, Gt. Barrier Reef, 1893, pp. 285 and 369, pl. xlv, fig. 2.

A specimen, 144 mm. long to the hypural joint, forwarded for identification by the Director of the Queensland Museum, differs from a smaller Indian example only in minor details. The second to the sixth dorsal spines are filamentous, the former reaching well beyond the hypural joint. Its general colour appears to have been pink with somewhat darker crossbars.

Locality.—The species has been recorded from Port Denison by Kent. This specimen was secured at Peel Island, Moreton Bay, Queensland.

FAMILY CHÆTODONTIDÆ.

HOLACANTHUS, CHÆTODONTOPLUS, CONSPICILLATUS Waite.

Holacanthus conspicillatus Waite, Rec. Austr. Mus. iii, 7, 1900, p. 203, pl. xxxv.

Ogilby's record of *H. conspicillatus* from Queensland (Mem. Qld. Mus. iii, 1915, p. 114) was based upon specimens properly referable to *H. personifer* McCulloch. He regarded the two as synonymous, but a comparison of five specimens of *personifer* with three of *conspicillatus* shows no intermediate forms, although the former varies considerably in its colour-marking.

A fine example, 205 mm. long, agrees in all details with Waite's types from Lord Howe Island. It was obtained near the Capricorn Group, Queensland.

FAMILY HEPATIDÆ.

ZANCLUS CANESCENS Linné.

Zanclus canescens and *Z. cornutus* (Linn) Bleeker, Atlas Ichth. ix, 1878, pp. 77-78, pl. 366, figs. 1-3.

Zanclus cornutus Macleay, Proc. Linn. Soc. N. S. Wales v, 1881, p. 548. *Id.* Stead, Proc. Linn. Soc. N. S. Wales xxxiv, 1909, p. 274.

Localities.—This widely distributed species was included in Macleay's Catalogue of Australian Fishes on the strength of an old collection specimen supposed to have been collected in Australian waters. A straggler from warmer waters was later recorded from Botany Bay, New South Wales, by Stead. A fine specimen 168 mm. long, which agrees with Bleeker's fig. 2, is in the Queensland Museum collection from near the Capricorn group, Queensland.

HEPATUS OLIVACEUS Bloch & Schneider.

Acanthurus epardi Lesson, Voy. Coquille, Zool. ii, 1830, p. 147, pl. xxvii, fig. 1.

Hepatus olivaceus (Bl. Schn.) Jordan and Evermann, Bull. U.S. Fish Comm. xxiii, i, 1905, p. 385, fig. 166.

A large specimen, 249 mm. long to the end of the middle caudal rays, agrees generally with Lesson's figure. The light shoulder-stripe extends backward to below the second dorsal ray, and is broadly margined with black.

This species has not been previously recognised from Australian waters. The specimen was obtained near the Capricorn Group, Queensland.

FAMILY CIRRHITIDÆ.

CIRRHITICHTHYS POLYACTIS Bleeker.

Cirrhitichthys polyactis Bleeker, Verh. Akad. Amsterdam xv, 1875, p. 16, and Atlas Ichth. viii, 1877, p. 147, pl. cccliv, fig. 1. *Id.* Weber, Siboga Exped. Fische, lvii, 1913, p. 259.

D. x/17; A. iii/6; P. viii/6; V. i/5; C. 15. L. lat. 50; L. tr. $4\frac{1}{2}$ -10. Depth (31 mm.) 2.6 in the length to the hypural joint (83): head (24) 3.4 in the same. Eye (7.5) 3.2 in the head; snout (5) 1.5, interorbital width (5.5) 1.3 in the eye.

Cheek-scales large, in $3\frac{1}{2}$ rows. Lips broad, maxillary curved, reaching backward to below anterior fourth of eye. Anterior nostril with a fimbriate appendage. Preoperculum strongly denticulated, the teeth largest above the rounded angle. A small canine on each side of the premaxillaries anteriorly, and an outer row of stronger teeth, followed by a band of villiform teeth which is widest near the symphysis. Mandible with a strong canine on each side, followed by a row of conical teeth; a band of villiform teeth between the canines. A curved band of minute teeth on the vomer, and a very small band on the anterior portion of each palatine.

Scales large, cycloid, and extending onto the bases of the vertical fins. Lateral line almost straight, forming an oblique line from the shoulder to the base of the caudal fin. Dorsal spines strong, each with a free membranous filament; the second is a little longer than the last, but is shorter than the anterior dorsal rays. First dorsal ray filamentous, the others decreasing slightly in length backwards; the base of the soft dorsal fin is a trifle longer than that of the spinous portion. Second anal spine longer than the third. Simple pectoral rays abruptly longer than the branched ones, the longest reaching backward to above the third anal spine. Caudal emarginate with the outer lobes produced into filaments.

Colour.—Uniformly light-coloured after preservation, with the upper half of the spinous dorsal dark grey; the anal also is somewhat dusky.

A single specimen, 99 mm. long to the end of the median caudal rays, is probably referable to *C. polyactis*. It differs from Bleeker's figure principally in being rather more slender posteriorly.

Locality.—Near the Capricorn Group, Queensland.

FAMILY BOTHIDÆ.

PLATOPHRYS PANTHERINUS Ruppell.

Platophrys pantherinus (Ruppell) Bleeker, Atlas Ichth. vi, 1870, p. 11, pl. cexxxiii, fig. 3. *Id.* Ogilby, Mem. Qld. Mus. ii, 1913, p. 90.

Variation.—A series of seven specimens, 38-198 mm. long, which I collected at Murray Island, exhibits considerable variation. Of the two largest specimens, which are of almost equal length, one has the elongated pectoral rays figured by Bleeker, and the orbital margins and snout are provided with several spiniform rugosities. In the other the pectoral is short and the spines are wanting.

Localities.—This species has been recorded from Darnley Island, Torres Strait, by Ogilby. Australian specimens are in the Australian Museum from Murray Island, Torres Strait, and from near Cape Flattery, North Queensland. Others are in the collection from Lord Howe Island, Funafuti, Pleasant Island, and India.

PLATOPHRYS POLYOPHTHALMUS Bleeker.

Platophrys polyophthalmus Bleeker, Ned. Tijds. Dierk. iii, 1866, p. 46, and Atlas Ichth. vi, 1870, p. 12, pl. cexxxiv, fig. 3.

A specimen, 137 mm. long, differs from Bleeker's description and figure only in having the rostro-frontal border a little more convex. The elongate pectoral ray reaches nearly to the end of the dorsal, and there is a bony tubercle on the anterior part of the snout and one on the anterior margin of the lower orbit; both these characters are variable in *P. pantherinus*, so evidently have no value as specific characters. In all other details the specimen is as described and figured by Bleeker.

Locality.—Between Cairns and Rockhampton, Queensland. The species has not been previously recognised from Australian waters.

FAMILY TETRAODONTIDÆ.

CANTHIGASTER Swainson.

Key to the Australian species:—

a. Body without longitudinal stripes; caudal fin almost or quite plain.

b. Body with four dark cross-bands.

c. Anterior cross-band behind the eyes; predorsal band nearly vertical .. *valentini*.

cc. Anterior cross-band between hinder portion of eyes; predorsal band markedly oblique *cinctus*.

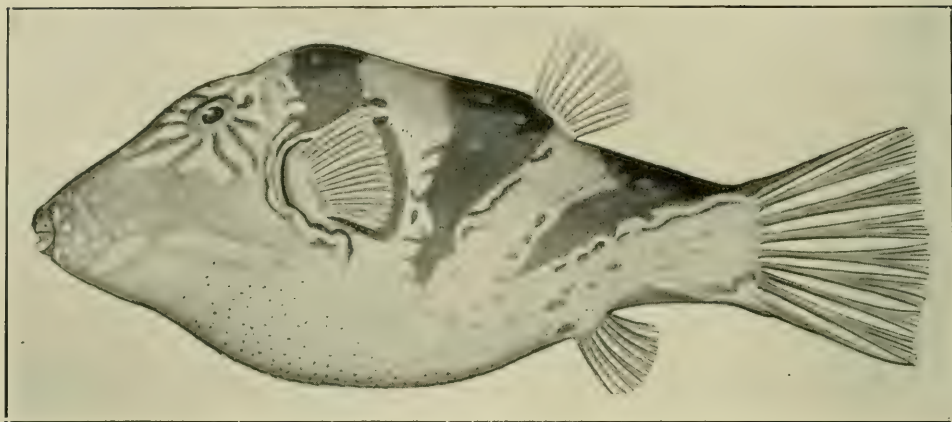


Fig. 1.—*CANTHIGASTER CINCTUS* (Richardson).

A. R. McCulloch, del.

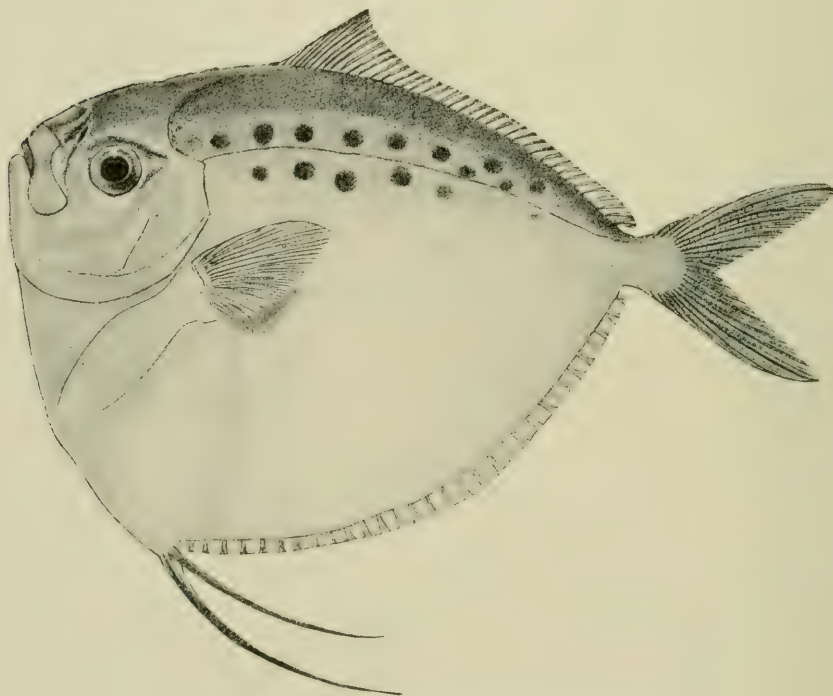


Fig. 2.—*MENE MACULATA* Bloch and Schneider (after Day).

- bb. Body without distinct cross-bands; a dark ocellus below origin of dorsal, indistinct in large specimens *bennetti*.
- aa. Body with one, sometimes two, dark longitudinal bands from snout to tail, and extending along upper and lower margins of caudal fin.
- d. Back and snout closely covered with dark lines and spots, the lower parts with or without many blue spots *callisternus*.

CANTHIGASTER CINCTUS (Richardson) Jord. & Everm.

(Pl. XIV, fig. 1.)

? Tetrodon cinctus Richardson, Zool. Samarang, Fishes, 1848, p. 20.*Canthigaster cinctus* Jordan and Evermann, Bull U.S. Fish Comm. xxiii i, 1905, p. 433, fig. 189.

A beautifully preserved specimen, 131 mm. long, agrees with Jordan and Evermann's figure quoted above, and differs from *C. valentini* in the disposition of its dark cross-bands. It is from near the Capricorn Group, Queensland.

CANTHIGASTER VALENTINI Bleeker.*Tropidichthys valentini* Bleeker, Nat. Tijds. Ned. Ind. iv, 1853, p. 130.*Canthogaster valentyini* Bleeker, Atlas Ichth. v, 1865, p. 80, pl. ccviii, fig. 1.*Canthigaster valentini* McCulloch, Proc. Linn. Soc. N. S. Wales xxxvi-3, 1911, p. 423.

Two specimens, collected at Murray Island, Torres Strait, were recorded by McCulloch.

CANTHIGASTER BENNETTI Bleeker.*Tetrodon ocellatus* Bennett, Fish Ceylon, 1828-30, pl. xxi (name preoccupied).*Tropidichthys bennetti* Bleeker, Nat. Tijds. Ned. Ind. vi, 1854, p. 504.*Canthogaster ocellatus* Bleeker, Atlas Ichth. v, 1865, p. 80, pl. ccxiv, fig. 5.*Canthigaster bennetti* McCulloch, Proc. Linn. Soc. N. S. Wales xxxvi, 1911, p. 305.

Several specimens from Murray Island, Torres Strait, were recorded by McCulloch.

CANTHIGASTER CALLISTERNUS Ogilby.*Tetrodon callisternus* Ogilby, Mem. Aust. Mus. ii, 1889, p. 74, pl. iii, fig. 5.*Eumycterias callisternus* Ogilby, Mem. Qld. Mus. i, 1912, p. 62.

Recorded from Southport, Queensland, by Ogilby. Several specimens of various sizes are in the Australian Museum from Lord Howe Island.

AN ICHTHYOSAURIAN SKULL FROM QUEENSLAND.

BY HEBER A. LONGMAN, F.L.S., DIRECTOR, QUEENSLAND MUSEUM.

(Plates XV and XVI and Text-figures 1 and 2.)

The remains which are the subject of this paper were found at Galah Creek, about twelve miles from Hughenden, in the Rolling Downs formation (Lower Cretaceous) of Western Queensland, and were collected, forwarded, and kindly donated to the Queensland Museum by Mr. S. Dunn and Mr. William Elliott in May, 1914. It is my pleasant duty heartily to thank these gentlemen for their enthusiastic work in securing this large and valuable specimen for our collections.

MATERIAL.—As will be seen from the profile view, illustrated in Plate XV., this large skull is in six pieces. The extreme end of the rostrum is missing, but, judging from the structure of the anterior part preserved, only a small portion would be needed to complete the skull. Gilmore¹ has pointed out how frequently the extreme anterior segment is missing in Ichthyosaurs, and how fractures are caused by the cracking of specimens when enclosed in an elongate concretionary mass.

The skull is massive, with a maximum length (mandibular) of 1,026 mm., and a maximum width (articular area of mandible) of 395 mm. It is evident that great changes have taken place since it came to rest. As a result of tremendous vertical pressure, the whole of the teeth, with the exception of broken roots, have been forced from the continuous dental grooves, characteristic of *Ichthyosaurus*, and the premaxillary and mandibular rami are now in juxtaposition. Fortunately, many of the teeth have been preserved, mostly as fragments, on the lateral and lower surfaces of the jaw. In the posterior part of the skull there are still greater evidences of changes under intense pressure. On the left-hand side the orbit has been crushed down and its original contours are not distinguishable. As a result of this lateral torsion, the mandible has been somewhat displaced to the right. The supratemporal fossæ are preserved in fairly symmetrical condition. Great difficulty has been experienced in studying some of the component parts. The distortion of the skull is accompanied by a very close investiture of the remains by a fine hard limestone matrix, which in places is almost indistinguishable from the actual fossil. The matrix involving *Cratochelone berneyi*,² described by the author in 1915 from the same district, was very similar in texture. This investing material evidently penetrated the skull after the decay of cartilage, cementing the disrupted elements together.

¹ C. W. Gilmore, Mem. Carnegie Mus., Pitts., II, 1905, p. 80.

² H. A. Longman, Mem. Qld. Mus., III, 1915, p. 25.

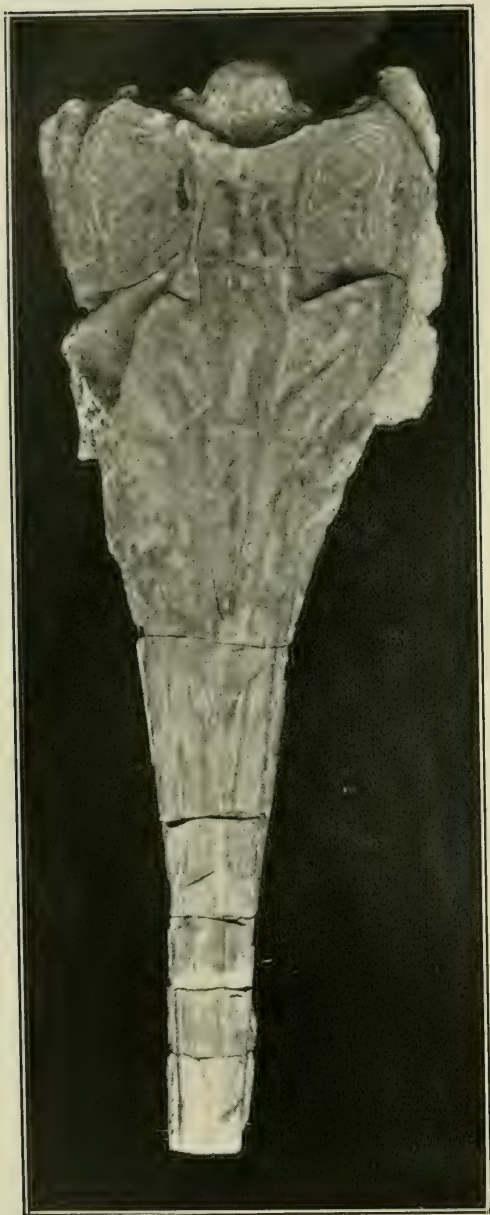


Fig. 1.—Skull of *ICHTHYOSAURUS AUSTRALIS*. Superior view.



Fig. 2.—Skull of *ICHTHYOSAURUS AUSTRALIS*. Lateral view. Approximately one-seventh natural size.

On the upper part of the skull the elongate premaxillæ can be traced back for a distance of 615 mm. to the narial openings. Between these two bones in the superior surface is a well-marked symphysial groove. The nasals are exposed from beneath the premaxillæ at about the anterior third of the length of the skull, and at first are on a lower plane than the hemispherical superior borders of the diverging premaxillæ, forming a triangular recess. Further back there is a secondary triangular depression, the borders of which are parallel to the anterior recess, but this is entirely internasal. Lateral divisions of the nasals extend outwards beyond the frontals towards the superior border of the orbits. Sutures with post frontals cannot be traced.

The external narial openings can be seen on both sides, but they are distorted. A semicircular raised border is present behind the openings. Incomplete maxillæ are present, but the sutures between them and the lachrymal bones and the jugals cannot be positively traced on either side.

In the region of the frontals a remarkable rectangular raised process was present in the undisturbed fossil. On careful development this proved to be mainly matrix closely investing a troughlike depression, with raised lateral borders, as may be seen in Plate XV. At first this was thought to be a veritable raised bony border surrounding the pineal foramen, and suggesting an unusual development of "the third eye," but the true foramen is apparently situated in a more posterior position. This closely adpressed structure consists of two parallel bars, thinly joined anteriorly; the bars are 90 mm. in length and are symmetrically disposed at a distance of 10 mm. from the median line. If this structure is actually *in situ*, which seems unlikely, it would demand generic recognition. The frontal bones evidently do not extend far beyond the area of this structure. In view of the partial disorganization of the specimen, possibly associated with an attack from other predaceous or scavenging monsters of the period, it is suggested that this curious structure represents an inverted cranial element. It cannot, however, be allocated with any of the bones, the contours of which are so clearly demonstrated by Sollas' classic sections,³ and possibly represents hyobranchial elements. And it is, of course, possible that further material will demonstrate characters which will warrant the establishment of a new genus for this large Australian Ichthyosaur. The prominent ridges, which are present in the parietal region and on the nasal bones, appear to be distinctive features. From the occipital border of the parietal region a convex median ridge extends anteriorly, and this is accentuated by the presence on each side of elongate valleys, the lateral sides of which curve upwards to form the borders of the supratemporal fossæ. At the anterior termination of the median ridge there is a cavity which could not be traced into the internal tables of the skull, but which probably represents a disrupted pineal foramen. This is nearly in line with the anterior borders of the supratemporal fossæ, and is thus in the usual position for the foramen.

³ W. J. Sollas, Phil. Trans. Roy. Soc., B, 208, 1916, pp. 66-126.

In the temporal region the anterior horn of the squamosal extends to the middle of the large oval fosse, articulating with the postorbital. The fossæ are fairly symmetrical, approximately 120 mm. in length, with a breadth of 75 mm.

On the right-hand side the orbit is well preserved, except for its posterior border. The cavity has been largely set free from the cement-like matrix, which here contained molluscan fragments. It was carefully excavated in the hope that the characteristic sclerotic plates, possibly driven inwards, might be exposed, but these have entirely disappeared. It is evident that the orbit was the characteristic oval. Its vertical diameter at the periphery is 110 mm. Beneath the orbit, portions of the jugal can be seen, but the full extent of the zygomatic arch with its sutures cannot be outlined. The jugal appears first as a raised process near the midline of the anterior border of the orbit and then curves down to form its lower edge.

A large supratemporal bone is present on the left-hand side, and its superior margin junctions with the lateral border of the squamoso-postorbital arcade. Much controversy has taken place over the "additional temporal bone," as S. W. Williston called it in the Ichthyosaurs, and the author has followed the nomenclature of Lydekker,⁴ Sollas (*loc. cit.*), Gilmore, and Andrews in calling it supratemporal. Williston considered the inner bone of this "Diapsid" group the tabular and the outer the squamosal,⁵ but in view of Watson's demonstrations⁶ it is surely better to reserve the name "squamosal" for the more constant element. Perhaps the latero-temporal or "sclerodermal plate," as Owen called it, is really a separated division of the quadratojugal.

The quadratojugal is present, and its posterior portion is visible in the occipital region, where it forms the inferolateral border of the vacuity presented by the curved shaft of the quadrate. Its sutures with the supratemporal are obscure.

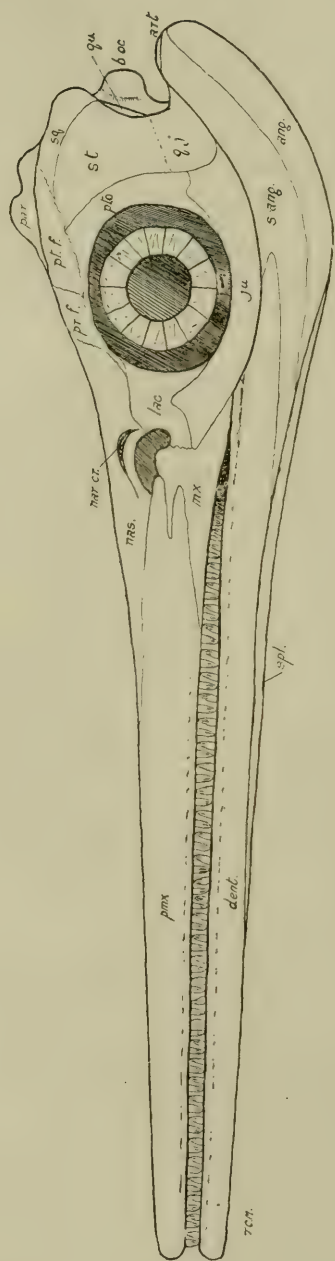
BASI-OCCIPITAL.—The stout symmetrically convex condyle extends backwards beyond the pterygoids for a distance of 33 mm.; the transverse diameter is 74 mm., vertical diameter 64.

BASIS CRANII.—The suture between the basioccipital and the basisphenoid can be traced, giving a length of 60 mm. to the former bone. The basisphenoid is about 75 mm. in length, and forms with the posterior element a rectangular rostrum for the support of the pterygoids. The basisphenoid has a visible width of about 60, whilst the basioccipital is about 40 mm. Near the posterior margin of the basisphenoid the opening of the single canal for the carotic arteries can be clearly seen: this foramen is circular and has a diameter of 10 mm. In the median line of the interpterygoid vacuities the splint-like parasphenoid may be seen, but this has been only partially freed from the matrix, compared with which it is very friable. This bone evidently increases in thickness towards its upper surface and is triangular in section. It can be traced anteriorly for a distance of 220 mm., where it is

⁴ R. Lydekker, *Catal. Foss. Rept. Brit. Mus.*, Part 11, 1889, p. 3.

⁵ S. W. Williston, *Phylogeny and Classification of Reptiles* (*Journ. Geo.* XXV), 1917, p. 416.

⁶ D. M. S. Watson, *Ann. Mag. Nat. Hist.* (8) XIV, 1914, pp. 84-95.



Text-figure 1.—Reconstruction of the skull of *Ichthyosaurus australis*. Approximately one-seventh natural size.

Ang., angular; *art.*, articular (showing post-articular surface); *b. oc.*, basioccipital; *dent.*, dentary; *ju.*, jugal; *lac.*, lacrymal; *mc.*, maxilla; *nar. cr.*, nasal crest; *nas.*, nasal; *par.*, parietal; *pmc.*, premaxilla; *pr.f.*, prefrontal; *pt.f.*, postfrontal; *pt.or.*, postorbital; *q. j.*, quadratojugal; *qt.*, quadrate; *s. ang.*, surangular; *st.*, squamosal; *sp.*, splenial; *t.*, supratemporal.

lost in matrix. The pterygoids provide the greater part of the base of the posterior moiety of the skull. On the left-hand side the pterygoid is in juxtaposition with and somewhat overlaps, owing to displacement, the basioccipital and basisphenoid. The right pterygoid has been tilted below the plane of the flanges presented by the axial bones. From the basioccipital to the lateral border the pterygoid attains a maximum breadth of 110 mm.

Owing to the presence of superimposed hyoid rods, and a brecciated mass of broken teeth and matrix containing associated fossils, the central portion of the lower surface of the fossil is obscured. The extent of the interpterygoid vacuities cannot be gauged, but, judging from the converging inner margins of the bones, the contours in this area are similar to the skull of *Ichthyosaurus longifrons* as figured by Owen.⁷ The palatine elements appear to be displaced and are not visible in the same plane.

POSTERIOR REGION.—The contours of the superior border of the occipital region, formed by the parietals and processes from the squamosals, are quite continuous, being convex in the median area and then sloping to lateral concavities. Viewed from above, the postero-external borders of the squamosal are seen to curve symmetrically backwards, and, although the occiput is somewhat disrupted, the contours are quite elegant. The inner process of the squamosal unites in an oblique suture with the lateral arm of the parietal near the median line of the supratemporal fossa.

A large quadrate is present on each side, but owing to mandibular pressure these bones have been forced somewhat out of position.

Above the region of the foramen magnum, only small fragments are visible in the matrix of elements which correspond to the superior occipitalia, which have apparently been forced inwards. Possibly these are paired extensions of the supraoccipital which form part of the lateral borders of the foramen magnum.

The opisthotics are in place on each side, and junction with the basioccipital, the "stapes," and the squamosal.

SUGGESTIONS FOR A RE-INTERPRETATION OF THE SO-CALLED STAPES—

Next to the quadrate, the largest bone in the occipital region is the element called "stapes" by Sollas and Andrews. This acts as a strong lateral buttress of the basioccipital, and lies above the posterior flange of the pterygoid. It has an expanded facet for junction with the basioccipital, with an adjoining superior surface for association with the opisthotic. Cope,⁸ who was the first to name this bone, did so with diffidence, and figured it as distinctly separated from the basioccipital, whereas modern authors rightly show it as a buttress supporting the rostrum of the condyle. Owen⁹ named it the paroccipital, but apparently only

⁷ Owen, Liassic Reptilia, Mon. Pal. Soc., 1881, Pl. XXV.

⁸ Cope, Proc. Amer. Assn. Ad. Sc., 1871, p. 199, fig. 2.

⁹ Owen, Mon. loc. cit., p. 94.

dealt with two pairs of occipital elements below the supraoccipital. C. W. Andrews notes that this bone (stapes) "seems to have lost its auditory function,"¹⁰ and it is obvious that this so-called stapes cannot be associated with the fenestra ovalis, as Cope supposed. The stapes is usually regarded as the homologue of the hyomandibulare of fishes, and a large stapes is recorded for the Cotylosauria. Case figures the stapes of *Dimetrodon*,¹¹ a bone which in this and allied Permian reptiles is regarded by Broom¹² as the tympanic. The writer is unable to find, however, a parallel in literature to the interpretation of this buttress bone of the Ichthyosaurs as a stapes.

The columella auris of modern reptiles, the proximal end of which is presumably homologous with the stapes, is always placed antero-laterally to the basioccipital, and is quite distinct in position from this buttress bone.

The writer suggests that these lower lateral elements in the occipital region, the so-called stapes, should be interpreted as inferior divisions of the exoccipitals. That the upper elements are true exoccipitals seems to be demonstrated by the position of the foramen for the post-auditory nerves, as clearly shown in Andrews's illustrations (*loc. cit.*), and also by their relations to the foramen magnum. The unusual extension of the intermediate lateral occipitalia, the opisthotics, to the basioccipital, to which they also act as buttress bones, has probably brought about a division of the exoccipitals into upper and lower portions.

These lower lateral elements may thus be interpreted as inferior divisions of the exoccipitals. This change in nomenclature, giving the exoccipitals a ventral extension, appears to be generally supported by the position of the occipital elements in the Permian Tetrapoda studied by von Huene¹³ and by R. Broom¹⁴, and in the Stegocephalia illustrated by C. Wiman.¹⁵ It is in consonance with the general arrangement of the bones in modern reptiles, where the exoccipitals are usually the lower lateral elements in juxtaposition with the basioccipital, the opisthotics uniting with them antero-superiorly in adult life (distinct in Chelonians); these relationships of the two elements are shown by Parker's studies of the development of the skull in the snake and the lizard.¹⁶ It is not at variance with Howes and Swinnerton's interpretation of the development of the skull of *Sphenodon*.¹⁷ It agrees also with the positions given by Kingsley in his diagram of the schematic vertebrate skull.¹⁸ Huxley wrote that but for its large size he would have regarded the adjoining bone, now generally accepted as the opisthotic, as the stapes.¹⁹

¹⁰ C. W. Andrews, *Marine Rept.* Oxford Clay, Brit. Mus., 1910, p. 11.

¹¹ E. C. Case, *Bull. Amer. Mus. Nat. Hist.*, XXVIII, 1910, p. 190.

¹² R. Broom, *Bull. Amer. Mus. Nat. Hist.*, XXVIII, 1910, p. 223.

¹³ von Huene, *Bull. Amer. Mus. Nat. Hist.*, XXXII, 1913, pp. 315-386.

¹⁴ R. Broom, *Bull. Amer. Mus. Nat. Hist.* XXXII, 1913, p. 563, etc.

¹⁵ C. Wiman, *Bull. Geol. Inst. Upsala*, XIII, 1915, Pt. 1.

¹⁶ W. K. Parker, *Phil. Trans. Roy. Soc.*, Vols. 169 and 170, 1878-79.

¹⁷ Howes and Swinnerton, *Trans. Zool. Soc.*, XVI, 1901.

¹⁸ Kingsley, *Outlines Comp. Anat. Vert.*, 2nd edit., p. 74.

¹⁹ Huxley, *Anatomy of Vertebrated Animals*, 1871, p. 211.

The opisthotic or paroccipital very rarely appears to meet the basi-occipital below the exoccipitals in other reptiles, although the relations between these elements are variable. The writer has diffidence in using terms that are not accepted by leading authorities, but the occipital region of the Ichthyosaurs provides material for several interpretations, and the use of exoccipital for the lower element seems to solve the difficulty of a most anomalous "stapes."

In the modern cetaceans the stapes is frequently reduced to a small conical plug, and, judging from analogy, the auditory functions of the Ichthyosaurs would not have been greatly utilised. Possibly the real stapes is the "long slender process" demonstrated in Section 494 of the very fine series in Sollas' great work (*loc. cit.*).

The stapes is often missing in fossils. The elaborate studies by D. M. S. Watson of the position of the fenestra ovalis in Therapsids, *Seymouria*, etc. (P.Z.S., 1914, and 1919) have an important bearing here, but the posterior aspect of the occipitalia in our specimen presents no evidence on this point.

The massive architecture of the occipital region was evidently associated with the attachment of powerful nuchal muscles. Perhaps a specialist will one day work out details of the probable musculature of the Ichthyosaurs on similar lines to the recent studies by Gregory and Camp on *Cynognathus*.²⁰

LOWER JAW.—On the left hand side the lower jaw is practically complete, except for the missing anterior segment and a small portion of the angulare. The dentary is very elongated and is no less than 875 mm. in maximum length. Parallel with the alveolar border, and situated about 20 mm. below it, is a groove which is shallow anteriorly, but then deepens, giving the characteristic conjoined gun-barrel effect of the Ichthyosaurian rostrum. The posterior process of the dentary, which overlaps the surangulare, runs back to below the mid-region of the supra-temporal fossa. Here the semi-spherical contours (in section) of the upper rod, or gun-barrel-like process, sink into the same plane as the surangulare and angulare.

The left angulare is not quite complete at its posterior end, and here its outer contours have been disturbed. It is a longer and more massive bone than the surangulare, but just at the termination of the dentary the two posterior elements are of equal depth. In this region the arrangement of the bones is very similar to the outer view given by C. W. Andrews for *Ophthalmosaurus* in Text-fig. 20 (*loc. cit.*), except that the angulare is distinctly extended to form the posterior portion of the mandible. Strong depressor muscles were evidently attached here, working with short leverage in association with the powerful levators placed in front of the articulation. Sollas points out that the levator muscles originating in the temporal region, inserted on the lower jaw, acting as levers of the third order, were "admirably adapted for snapping; and the Ichthyosaurus, from all that we know of it, must have obtained its food by seizing fish 'upon the wing.'"

²⁰ Gregory and Camp, Bull. Amer. Mus. Nat. Hist. XXXVIII, 1918, pp. 447-563.

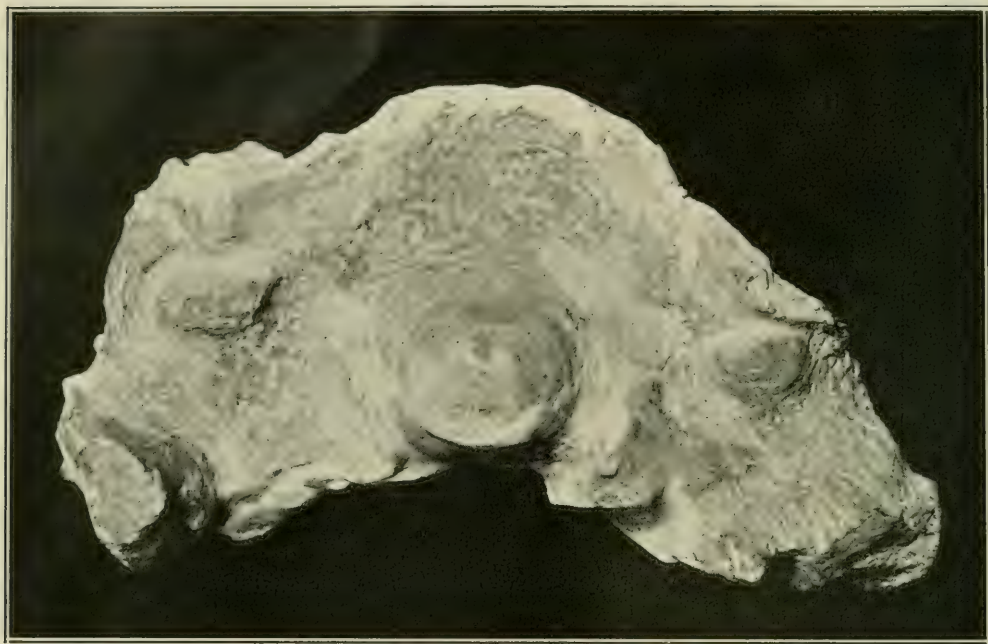


Fig. 1.—Skull of *ICHTHYOSAURUS AUSTRALIS*. Posterior view. Approximately one-third natural size.

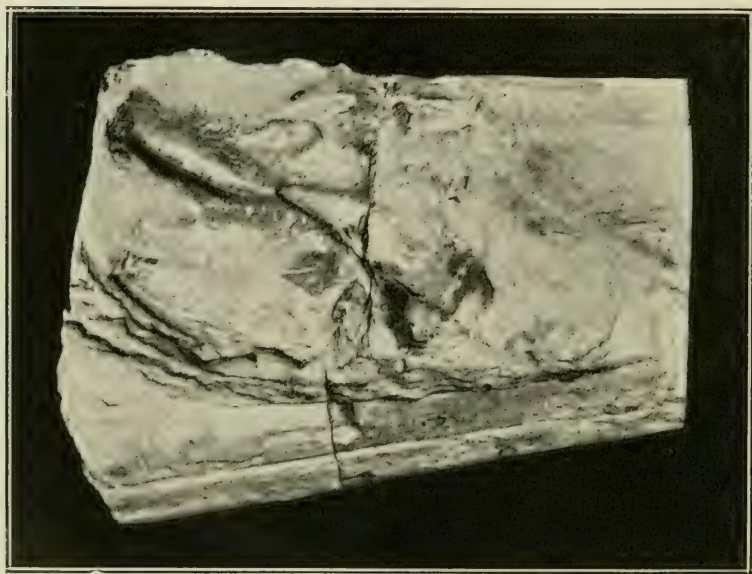


Fig. 2.—Anterior section of rostrum, *ICHTHYOSAURUS AUSTRALIS*, showing disrupted teeth. Approximately one-half natural size.

The articular is present and evidently rests in its original position on the angular, with its outer lateral surface adjoining the surangulare. Only the post-articular area has been freed from the matrix, and this is obliquely set on the angular, with its upper surface turned towards the supraoccipital region.

The splenials first appear on the lower surface of the mandible at a distance of one-fifth of the length of the skull, this being greatly in advance of the divergence of the premaxillæ to expose the nasals in the upper jaw. They are visible for a considerable distance on the inferolateral margin. The relative proportions of these elements are shown in Text-fig. 1. The condition of the fossil does not present evidence for the description of the inner side of the mandible.



Text-figure 2.—Section showing premaxillary and dentary elements, with teeth fragments, in the polished surface of anterior segment of rostrum, *Ichthyosaurus australis* (natural size).

The internal structure of the anterior end of the rostrum has been demonstrated by polishing, and is shown in Text-fig. 2. The alveolar groove has a well-developed inner wall with an expanded margin. On each side of the lower jaw the section exposes a foramen leading from the nutrient groove to the vascular canal. This section is entirely from premaxillary and dentary elements.

TEETH.—Unfortunately there are no complete teeth *in situ* but, as previously stated, remains have been preserved adhering to external surfaces. Some of these

which were cemented to the lateral surface of the rostrum are shown in Plate XVI. Between the mandibular rami about the mid-region of the skull there is a brecciated mass formed mainly of broken teeth, although containing other fossils. The teeth are subcylindrical, and there are no anterior or posterior carinae. They are about 55 mm. in length, with a maximum diameter of 18 mm. After counting the number of grooves on exposed contours, it is considered that a perfect specimen would have about thirty longitudinal striae. The teeth are evenly conical, and there is no marked tumidity at the alveolar border. Judging from the numerous fragments, they were fairly isodont, but some of the roots are decidedly compressed. They are somewhat larger than those in the type specimen in this Museum of *Ichthyosaurus marathonensis*, Etheridge *fil.* It is estimated that about forty teeth were present in each alveolar groove.

On the posterior third of the lower jaw, and cemented thereto, may be seen remains of the stout, cylindrical "hyoid rods" (to use Sollas' term). These are 15 mm. in diameter, and attain a length of 250 mm. They also overlap the lateral surface on the left-hand side, as may be seen in Plate XV.

Unfortunately no other remains were found in association with the skull, and although this Museum contains several specimens of vertebrae, a paddle, and a few other fragments from Western Queensland Cretaceous formations, it would be unwise to describe these in conjunction with the present material.

CLASSIFICATION.—The Ichthyosauria have been divided into four families :—*Mixosauridae*, *Ichthyosauridae*, *Baptanodontidae*, and *Shastasauridae*, the last-named being added by Merriam in 1902.²¹ The diagnostic characters of the majority of recent genera are not founded on cranial characters. It is evident, however, that our fossil has no affinity, generically, with the *Ophthalmosaurus-Baptanodon* group (Jurassic), which is characterised by an enormous eye and a very reduced dentition. Neither is it related to *Mixosaurus* (Triassic), in which the teeth are not set in a continuous groove. In the occipital and mandibular regions and in the basis cranii the elements in the Queensland skull approximate to the *Ichthyosaurus* type, but apparently unique characteristics are present on the superior surface of the skull.

Two species of *Ichthyosaurus* have been described from fragments obtained in the Cretaceous deposits of Western Queensland. In 1867, McCoy briefly described *Ichthyosaurus australis*²² and in 1869 supplied some additional details.²³ His material consisted of two portions of the skull, teeth, some dorsal vertebrae, paddles, and a humerus, radius, and ulna, and his short description was not illustrated. In 1888, Etheridge *fil.* described *Ichthyosaurus marathonensis*²⁴ from a maxillary and dentary section ten inches in length, which is now in the Queensland Museum. In 1892

²¹ Merriam, Bull. Dep. Geol., Univ. Calif., Vol. III, 1902, p. 87.

²² McCoy, Ann. Mag. Nat. Hist., XIX, 1867, p. 355; XX, p. 196.

²³ McCoy, Trans. & Proc. Roy. Soc. Vic. IX, 1869, pp. 77-78.

²⁴ Etheridge, Pr. Linn. Soc. N.S.W., III, 1888, p. 405, Pl. VII.

Etheridge gave details of these species with actual localities and records of other fragments, and queried the identity of the two species.²⁵ In 1897 he made a further note on precaudal vertebra as being *Ichthyosaurus australis*.²⁶ Direct comparison between the type fragment of *I. marathonensis* and the present skull shows too great a similarity, so far as this region is concerned, to warrant the introduction of a new specific name; indeed the type fragment, except for the slightly smaller teeth, could almost be placed as a section of the rostrum of our fairly complete skull without doing violence to its contours.

Unfortunately, McCoy's material was too inadequately described to permit Etheridge to make a satisfactory comparison. The teeth were compared with those of *I. campylodon*, and the antero-posterior diameter of the orbit was given as five and a-half inches. Chapman figured a cranial fragment and a paddle of the type material in his useful handbook.²⁷ McCoy's species has priority, and in the present state of our knowledge it is deemed inadvisable to ignore it in connection with the Queensland skull, with which its sectional dimensions fairly agree. Our specimen has therefore been catalogued as *Ichthyosaurus australis* McCoy.

I. marathonensis is regarded as a synonym. There is evidence, however, of another species occurring in Queensland, distinguished by smaller teeth, but this awaits further material before elucidation.

The relationships of the Ichthyosaurs have been the subject of recent research by such prominent authorities as Sollas, Andrews, Williston, Merriam, van Huene, and Broom, and partly centre around the homologies of the temporal elements. It is now generally agreed that the Ichthyosaurs are descended from the primitive Permian Carboniferous Cotylosaurs. This primitive reptilian group exhibits ordinal characters which, in the words of W. K. Gregory, are "structurally ancestral to all the higher vertebrates."²⁸ This fascinating problem, with its wealth of literature illustrating very numerous forms, is too intricate to be dealt with here. From the standpoint of popular interest it may be mentioned, however, that an outstanding characteristic of most Ichthyosaurs, an elongated rostrum, is a common feature in very diverse vertebrates. Among the large present-day reptiles the prolonged snout of the gavials is remarkable. There are commonplace examples amongst birds and fishes. The Ziphoid Cetaceans, such as species of *Mesoplodon*, are mammalian types which rival the Ichthyosaurs in the extreme development of the anterior elements. This elongated rostrum is evidently a characteristic associated with special feeding habits, and is a demonstration of the mobility of vertebrate structure. Fortunately the specialised forms in these groups are not isolated, in this respect, but can now be studied in conjunction with allied genera and families

²⁵ Jack & Etheridge, *Geology and Palæontology of Queensland*, 1892, pp. 505-508.

²⁶ Etheridge, *Rec. Austr. Mus.*, III, 1897, pp. 66-68.

²⁷ Chapman, *Australasian Fossils*, 1914, fig. 133, p. 277.

²⁸ W. K. Gregory, "Origin and Evolution of Human Dentition," *Jr. Dent. Res.*, II, 1920, p. 100.

which are more conformable to the usual type of skull. The various developments of the rostrum in vertebrate crania provide abundant material to illustrate remarkable processes of evolution.

MATRIX.—Professor H. C. Richards, Hon. Petrologist and Mineralogist on our staff, kindly contributes the following note on the matrix :—" Stone-coloured, fine-grained, homogeneous calcareous mudstone. There is sufficient calcareous material to cause rapid effervescence with dilute hydrochloric acid, and a residual mass of cream-coloured clay material is left behind."

ASSOCIATED FOSSILS.—An almost-complete shark's tooth is present in the brecciated mass between the mandibular rami, and is probably an anterior tooth of *Lamna appendiculata* Agassiz.

Several specimens of the common bivalve, *Aucella hughendenensis* Etheridge were taken from the matrix, including fairly complete valves from the orbits. Two specimens of a small gasteropod were found, and Mr. W. H. Bryan, M.Sc., Hon. Paleontologist on our staff, has identified these as *Turritella* (?) *microlinea*, a rare shell which was named by Etheridge in 1920.²⁹

LIST OF PLATES.

Plate XV.

Figure 1.—Skull of *Ichthyosaurus australis*; superior view. ~~Approximately one-third~~ natural size.

Figure 2.—Skull of *Ichthyosaurus australis*; lateral view. Approximately one-seventh natural size.

Plate XVI.

Figure 1.—Skull of *Ichthyosaurus australis*; posterior view.

Figure 2.—Anterior section of rostrum, showing disrupted teeth. Approximately one-half natural size.

²⁹ R. Etheridge, Publ. No. 269, Qld. Geol. Sur., 1920, p. 13.

AUSTRALIAN BEES IN THE QUEENSLAND MUSEUM.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

PARASPHECODES Smith.

This genus, which is very closely allied to *Halictus*, consists of a large number of species, nearly all apparently with very restricted distribution. They may be oligotropic on particular flowers, but at present we know hardly anything of their habits. Smith described a number of species, giving them names which are anagrams of *Halictus*. I have examined the types of all of these, but to my surprise I fail to find them in the various Australian collections coming to hand in recent years. The genus is especially south-eastern, with no less than twenty-one species described from Tasmania, and nineteen from Victoria, one of the latter extending to Tasmania. Two of the Victoria species go north to Queensland, which has eight species and a subspecies of a Victoria one not known elsewhere. From South Australia five species have been described, but from West Australia only two, and N.W. Australia one. Two are only known from N.S. Wales. The series now before me from the Queensland Museum (to which the types will be returned) adds a number of species, separable from one another as follows:—

Clypeus partly yellow; males	1.
Clypeus all black; females	4.
1. Abdomen entirely black; mesothorax glaucous	<i>cerviculis</i> Cockerell.
Abdomen partly or wholly red	2.
2. Abdomen wholly chestnut-red; tubercles entirely black	<i>solis</i> n. sp.
Abdomen partly black	3.
3. Tegulæ light ferruginous	<i>longmani</i> n. sp.
Tegulæ black	<i>subrussatus</i> n. sp.
4. Abdomen entirely black	5.
Abdomen at least partly red	6.
5. Area of metathorax short, distinctly plicate, with a prominent raised rim	<i>cervicalis</i> Cockerell.
Area of metathorax long, feebly sculptured, subemarginate at apex, without a raised rim	<i>paramelænus</i> n. sp.
6. Flagellum red beneath	<i>lichatinus</i> n. sp.
Flagellum wholly black	7.
7. Larger; fourth abdominal segment entirely black	<i>hirtiventris</i> n. sp.
Smaller; fourth abdominal segment red	<i>annexus</i> n. sp.

***Parasphecodes cervicalis* Cockerell.**

Described from the ♀, collected in Tasmania. In December, 1919, Mr. Hacker took both sexes in the National Park, Queensland, where he also found the Tasmanian *Callomalitta littleri*. The specimens of ♀ *P. cervicalis* seem to differ slightly from the Tasmanian form, and when Tasmanian males are available may possibly be separable, but at present I am quite unable to state any valid distinctions. The occurrence of supposed Tasmanian endemics at various points on the mainland begins to carry the conviction that the Tasmanian bee-fauna does not represent a high degree of differentiation since the separation of the island, but rather the survival of a series of old species, some of which are now extinct on the mainland, while others are restricted to limited areas.

The male of *P. cervicalis* is new. It resembles the female, but is more slender, while the clypeus is chrome-yellow except for a large quadrate black mark on each side above. Labrum, mandibles, and antennæ black, the flagellum not strongly moniliform. There is black hair at the apex of the abdomen; the second ventral segment has a median elevation, without any tuft of hair. The abdomen is entirely black, the margins of the segments concolorous. There is a close general resemblance to *P. nigrinus* Meyer, from Tasmania.

***Parasphecodes solis* n. sp.**

Male. Length nearly 10 mm., slender, head and thorax black, abdomen entirely chestnut-red, suffused with dusky beyond the third segment, but with no black segments or dark markings; hair of head and thorax dull white, abundant on front and sides of face; some dark hair at end of abdomen; labrum and mandibles black or nearly; clypeus with an extremely broad pale yellow band, emitting a cuneiform extension upward; scape short, flagellum very long, strongly moniliform, the joints of the basal half marked with red beneath; mesothorax entirely dull, with a granular appearance; scutellum bigibbous, dull, and granular, without special tomentum; area of metathorax distinctly defined, angulate posteriorly, covered with very coarse wavy rugæ, between which it is distinctly shining; tegulæ dull red; wings dusky reddish, stigma dark reddish, nervures fuscous; second submarginal cell higher than long, receiving recurrent nervure very near its end; femora black, red at extreme apex; tibiæ red, the anterior pair clear and bright, the hind ones dusky; anterior tarsi dusky red, the others black or nearly; abdomen moderately shining, with excessively fine punctures, close and uniform on first two segments, on first segment extending to the margin; no prominence on under side of second segment.

Sunnybank, 19-11-13 (*H. Hacker*). In Meyer's table and in my table of Tasmanian species, this runs to *P. perustus* Ckll., but is larger, with darker antennæ, &c. It resembles *perustus* in having the third submarginal cell much broader above than second.

***Parasphecodes longmani* n. sp.**

Male. Length about or nearly 8 mm, rather slender, head and thorax black, abdomen dusky-red, with a broad black stain on middle of first two segments, and segments beyond the third wholly black; hair of head and thorax thin, brownish on face, front, vertex, and thoracic dorsum, pure white on cheeks and mesopleura; head broad, orbits strongly converging below; broad band on clypeus, with a cuneiform upward extension, labrum and greater part of mandibles yellow; antennæ black, the flagellum moniliform, not especially long (length somewhat over 4 mm.): front entirely dull, but a shining space in front of middle ocellus; mesothorax and scutellum dull, slightly glistening on disc, very minutely and densely punctured, scutellum bigibbous, without special tomentum; area of metathorax poorly defined, with fine vermiform rugæ; tegulæ bright yellowish-ferruginous; wings hyaline, slightly greyish; stigma dark reddish, nervures fuscous; second submarginal cell nearly square; first recurrent nervure entering base of third submarginal, as in *P. sulthica* Smith; femora black, with red knees; anterior and middle tibiæ and all the tarsi red; hind tibiæ black with broadly red base and a little red at apex; abdomen above with very scanty short hair, venter with much white hair, second ventral segment simple.

Caloundra, 20-1-16 (*H. Hacker*). Rather like *P. minimus* Meyer, but larger, with dark antennæ, &c. The tubercles are red. Dedicated to the Director of the Queensland Museum.

***Parasphecodes subrussatus* n. sp.**

Male. Length about or a little over 8 mm., not very slender, the abdomen broad at base, almost parallel-sided but slightly widening to the fourth segment; head and thorax black, with rather long dull white hair, faintly brownish dorsally; first abdominal segment black, broadly red apically, with a further red extension on sides; second segment red, with a transverse median black mark; third red, with a black spot at each extreme side toward base; fourth and following segments black, but the fourth red beneath, with a black median stain; at least lower half of clypeus shining lemon yellow, with a small median extension; labrum black; mandibles black, dark-reddish apically; flagellum long, clear ferruginous beneath; mesothorax and scutellum dullish, somewhat shining on disc, extremely finely punctured, scutellum bigibbous; area of metathorax poorly defined, with fine rugæ; tegulæ black; tubercles black; wings hyaline, slightly greyish, stigma and nervures ferruginous; second submarginal cell much higher than long, receiving recurrent nervure well before its end; legs black; abdomen shining, the red colour bright; second ventral segment simple.

Kosciusko, 26-1-14 (*A. J. Turner*). Very distinct by the marking of the abdomen, combined with the black tegulæ and legs.

***Parasphecodes paramelænus* n. sp.**

Female. Looks like *P. cervicalis*, with which I had mixed it, but it is a little smaller, with anterior wing about 7 mm.; face narrower, clypeus without a distinct median groove; mesothorax entirely dull black, not at all glaucous, with excessively dense and minute punctures; scutellum densely and minutely punctured; area of metathorax long, with no raised rim, its surface obscurely rugose, except apically; wings paler and strongly reddish; first recurrent meeting second intercubitus; outer side of third submarginal cell without a double curve; first two abdominal segments very finely, closely, and regularly punctured, the depressed apical part of second segment, and first to extreme apex, punctured; second ventral segment hairy, but without a distinct prominence. The apical part of abdomen has short black hair.

National Park, Queensland, Dec., 1919 (*H. Hacker*). *P. atronitens* Ckll. is very closely allied, but distinguished by the colour of wings and sculpture of abdomen.

***Parasphecodes lichatinus* n. sp.**

Female. Length about or nearly 10 mm., anterior wing nearly 8; robust, head and thorax black; abdomen with the first three segments deep chestnut-red, the first with a very broad blackened area across the middle, the third with the hind margin blackened; fourth and following segments black; hair of head and thorax dull whitish, thin on thorax above; clypeus shining, with sparse strong punctures; flagellum red beneath and at extreme tip, the colour almost brick red; mesothorax and scutellum densely and distinctly punctured, but glistening between the punctures; scutellum slightly bituberculate; area of metathorax with coarse irregular rugæ, more or less broken up, and a sharp hind margin; tegulæ dark red; wings reddish, strongly dusky in marginal cell, stigma and nervures piceous, stigma unusually narrow; second submarginal cell large, about square, about as broad above as third, receiving first recurrent nervure almost at apex; legs black, with coarse dark hair on outer side of hind tibiæ and tarsi; abdomen shining, finely punctured, apical part with black hair dorsally.

Ararat, Victoria (*H. W. Davey*). Very close to *P. lichatus* Smith, from Western Australia, but with darker wings, and I think separable.

***Parasphecodes hirtiventris* n. sp.**

Female. Length about 10 mm., robust, head and thorax black, their pubescence fulvous dorsally; abdomen with the first three segments dark red, the others black; first segment with a large T-shaped black mark, third with a transverse dusky cloud in middle, and hind margin darkened; an even narrow line of white cilia overlapping extreme base of third segment; tongue cuneiform, short and broad; clypeus shining, with scattered punctures; antennæ entirely black, scape very long; mesothorax and scutellum dull, extremely densely and minutely punctured; area of

metathorax long, shining, the basal half obscurely sculptured; extreme sides of metathorax densely hairy; mesopleura very hairy; tegulæ rufopiceous; wings dusky, darker at apex, stigma and nervures rather dilute sepia; outer recurrent and intercubitus weakened; second submarginal cell broad below, narrowed above, the recurrent nervure joining its extreme apex; legs black, hind legs with pale hair, that on tibiæ shining silvery, hind basitarsi with a bright red tuft at apex; abdomen shining, first two segments with extremely minute punctures; venter extremely hairy.

Ebor, 2-1-14 (*A. J. Turner*). In Meyer's table runs to *P. insignis* Meyer, from Tasmania, but the sculpture is very different. It is also related to *P. arciferus* Ckll. and *P. leptospermi* Ckll. *P. arciferus* differs at once by the area of metathorax and colour of pubescence, and the same may be said of *leptospermi*.

Parasphecodes annexus n. sp.

Female. Length a little over 7 mm., robust, head and thorax black, abdomen broad, chestnut-red, first segment with a very broadly triangular black area, and hind margins of all the segments strongly dusky; hair of head and thorax thin, slightly ochreous dorsally, white on cheeks and pleura; clypeus shining, with sparse punctures, and no median groove; antennæ black; mesothorax and scutellum shining, with small punctures, well separated on disc; area of metathorax semi-lunar with no raised rim, shining, finely rugose, subplicate basally; tegulæ dark-reddish, anterior margin hyaline; wings hyaline; stigma and nervures dark-brown, outer recurrent and intercubitus extremely weak; second submarginal cell about square, about as broad above as third; first recurrent nervure joining base of third submarginal, as in *P. sulthica* Sm., legs black, hair on hind legs pale, on hind tibiæ silvery, with a green stripe posteriorly; hind basitarsi with a bright red apical brush; abdomen without conspicuous punctures, first two segments excessively minutely punctured; venter hairy.

Adaminaby, N.S.W., 19-10-18 (*A. J. Turner*). In many ways similar to *P. melbournensis* Ckll., but much smaller.

HALICTUS Latr.

The following table separates a series of species in which the mesothorax is metallic, green or blue. Up to the present, thirty-two species of this type have been described from Australia (including Tasmania). Some additions are given below:—

Males	..	..	..	..	..	..	..	..	..	..	..	1.
Females	..	..	..	..	..	..	..	..	..	..	..	3.
1. Clypeus largely yellow, mandibles yellow	..	..	..	..	..	..	..	..	..	..	<i>purnongensis</i> Ckll.	
Clypeus without yellow	..	..	..	..	..	..	..	..	..	..	..	2.
2. Hind tibiæ light red	..	..	..	..	..	..	..	..	..	..	<i>olivinus</i> n. sp.	
Hind tibiæ black, red at extreme ends. (Caloundra, 20-1-16)	..	..	..	..	..	..	..	..	..	..	<i>kesteveni</i> Ckll.	

3. Abdomen metallic	4.
Abdomen not metallic	5.
4. Abdomen bright steel-blue. (Brisbane, 12-2-18)	<i>caloundrensis</i> Ckll.
Abdomen greenish. (Brisbane, 12-2-18)	<i>dampieri</i> Ckll.
5. Abdomen red, head black	6.
Abdomen black or dark-brownish	7.
6. Smaller; mesothorax shining	<i>erythrurus</i> Ckll.
Larger; mesothorax dullish, with larger scattered punctures. (Oxley, Brisbane, Sept., 1914; Brisbane, 4-9-14, 6-10-14, 26-9-16)	<i>brisbanensis</i> Ckll.
7. Head metallic	8.
Head black	9.
8. Stigma very dark. (Brisbane, 12-2-18, National Park, Q., Dec., 1919)	<i>urbanus</i> Smith.
Stigma reddish; scutellum shining, steel-blue, contrasting with the green mesothorax	<i>urbanus</i> var. <i>lomatiae</i> n. var.
9. Mesothorax green, dullish	<i>limatiformis</i> n. sp.
Mesothorax blue.. .. .	10.
10. Mesothorax steel-blue, highly polished; stigma dark	<i>humiliformis</i> n. sp.
Mesothorax not polished; stigma pallid	<i>mesocyaneus</i> n. sp.

The Queensland specimens were all collected by Mr. Hacker.

***Halictus purnongensis* Cockerell.**

The range is greatly extended by a male from Brisbane, 6-10-14 (*Hacker*). It represents a variation with the hind margins of the abdominal segments dark.

***Halictus erythrurus* Cockerell.**

Brisbane, 3-10-16, a variation with tegulæ darker than usual.

***Halictus olivinus* n. sp.**

Male. Length about or nearly 5 mm., slender, head and thorax shining dark olive green, the metathorax steel-blue, contrasting; labrum and mandibles dark-reddish; head unusually broad, eyes strongly converging below, clypeus polished and shining, front dull, shining along orbits; scape black; flagellum long and slender, ferruginous beneath; mesothorax shining but not polished, scutellum highly polished; area of metathorax large, with weak striæ, apical margin thickened; posterior truncation without sharp lateral edges; hair of head and thorax extremely scanty, white; tegulæ pale testaceous; wings hyaline, faintly dusky; stigma piceous; marginal nervure dark, the other nervures mainly pallid, the outer recurrent and intercubitus hardly visible; first submarginal cell much larger than the other two combined; second submarginal very narrow, third almost as narrow as second; first recurrent nervure meeting second intercubitus; femora rufopiceous, knees, tibiæ, and tarsi pale ferruginous; abdomen dark brown, brightly polished, venter with erect hair.

Brisbane, 3-3-14 (*H. Hacker*). I am at a loss to associate this with any known female. Among the described males it has some resemblance to *H. dampieri* Ckll., but in that species the area of metathorax is dull and quite different; in the present insect it is concave and shining. It is easily known from *H. hackeriellus* Ckll. by the red tibiæ.

***Halictus urbanus* var. *lomatiae* n. var.**

Female. Mesothorax peacock-green; scutellum bright blue, highly polished, contrasting; legs rufotestaceous; stigma rather dilute reddish-brown; flagellum bright ferruginous beneath. Outer recurrent nervure and intercubitus hardly visible.

Sunnybank, Brisbane, on flowers of *Lomatia*, 13-5-12. (*H. Hacker*.) I had taken this for a distinct species, on account of the shining blue scutellum and paler stigma, but microscopic examination shows that the hind spur, sculpture of area of metathorax and scutellum, &c., are precisely as in *H. urbanus*.

***Halictus limatiformis* n. sp.**

Female. Length about 5 mm., black, with the mesothorax only (not even scutellum) dark bluish-green; pubescence dull white, abundant and curled on under side of abdomen; apical part of mandibles very dark-reddish; front dull, orbital margins shining; antennæ black; mesothorax shining but not highly polished, with scattered punctures; scutellum shining; area of metathorax granular and dull, feebly plicate, with a shining margin; tegulæ dark castaneous; wings dusky hyaline; stigma large and very dark, nervures brown, outer recurrent and intercubitus almost obsolete; first recurrent nervure ending just before second intercubitus; third submarginal cell short, little longer than second; legs black, anterior knees red; abdomen shining black, without bands. Under the microscope the mesothorax is seen to be minutely tessellated, with widely scattered distinct punctures. Area of metathorax entirely without a sharp rim. Hind spur pectinate with small teeth.

National Park, Queensland, Dec., 1919 (*H. Hacker*). Very close to the Tasmanian *H. limatus* Smith, but that has the area of metathorax more distinctly striate, and pale testaceous tegulæ. It may be only a race of *limatus*.

***Halictus humiliformis* n. sp.**

Female. Closely resembling *H. limatiformis*, but differing thus:—Mesothorax shining blue, with a polished surface; area of metathorax with fine but regular and distinct plicæ or striæ (as in *H. limatus*, from which it differs by the shining mesothorax). By the small shining mesothorax it agrees with *H. humilis* Smith, but from that it differs by the black legs, with anterior knees red, and the entirely black antennæ. The hind spur is not pectinate; the scutellum is very sparsely punctured, and the surface of the mesothorax, between the punctures, shows only traces of tessellation.

Ebor, N.S.W., 30-12-15 (*A. J. Turner*).

Halictus mesocyaneus n. sp.

Female. Length about 5 mm., head and thorax black except the mesothorax, which is deep blue, somewhat shining, but not polished : legs black (anterior knees not red) : abdomen dark brown, suffused with dark-reddish, the hind margins of the segments paler : venter with long curled hair. Mandibles reddened apically : flagellum obscurely brownish beneath : greater part of front somewhat shining : scutellum shining : area of metathorax with delicate radiating striæ, and a shining rim : tegulæ reddish testaceous : wings yellowish hyaline, stigma large, pale-reddish : abdomen broad, shining. The area of metathorax is microscopically sculptured between the raised lines or plicæ. The mesothorax is microscopically tessellate, with widely scattered extremely weak punctures.

Bribie Island, 1-4-18 (*Hacker*). Smaller than *H. inclinans* Smith, and easily separated by the polished abdomen and black scutellum.

Halictus bicingulatus Smith.

Mr. Hacker has collected this as follows :—Males, Bribie I., 2-11-13, 2-11-15 ; females, Brisbane, 18-9-14. Sunnybank, Brisbane, at flowers of *Leptospermum*, 9-9-12 ; Kelvin Grove, 14-9-12, entering a hole in a clay bank.

Nomia moerens Smith.

National Park, Q., Dec., 1919 (*Hacker*).

Anthophora lilacina Cockerell.

Misprinted "*lilacine*" in Mem. Qu. Mus., VII, p. 84, but given correctly in Hacker's Catalogue.

GNATHOPROSOPIS Perkins.**Gnathoprosopis amiculiformis** (Cockerell).

Prosopis amiculiformis must go in *Gnathoprosopis*. A female was taken at Brisbane, 17-10-16 (*Hacker*).

Gnathoprosopis bituberculata (Smith).

Males were collected by F. M. Littler in Tasmania ; at Launceston, 7-11-15 ; and St. Helens, 14-1-16. The species is new to Tasmania.

Gnathoprosopis amicula (Smith).

Females, National Park, Q., Dec., 1919 (*Hacker*) ; a form with rather dusky wings. The chrome-yellow face-marks and much narrower clypeus readily distinguish this from *G. hackeri*.

Gnathoprosopis simpliciventris n. sp. (? *hackeri* var.).

Male. Agrees with *G. hackeri*, except that the under side of the abdomen has a pair of low inconspicuous elevations instead of large dentiform processes.

Brisbane, 6-10-14 (*Hacker*). This was taken on the same day as a male *hackeri*, and it seems nearly certain that it is a form of that species, in spite of the great difference and the prominences of the abdominal venter. A final decision can only be reached by observations in the field.

Gnathoprosopis amiculina n. sp.

Female (Type). Resembles *G. amicula*, but is somewhat less robust, with the anterior and middle tibiæ entirely black, and the hind ones narrowly cream-colour at base. The second submarginal cell is shorter, the scape is entirely black (though the flagellum is ferruginous beneath), and the lateral face-marks are more pointed above.

Male. Described as male of *amicula*, Mem. Queensl. Mus., V, p. 198.

The type is from Brisbane, 17-10-16 (*Hacker*). This is the Brisbane so-called *amicula*; renewed study, with more material, convinces me that it must be separated.

Gnathoprosopis hackeri Cockerell.

Female. Length about 7 mm., robust, considerably larger than *amicula* or *amiculina*; lemon-yellow lateral face-marks and swollen orange collar and tubercles as in *amicula*, but the orange of the prothorax is broadly interrupted in middle, and the lateral face-marks are distinctly narrower, obliquely truncate above. Scape black, flagellum ferruginous beneath; mandibles as usual in the genus; mesothorax and scutellum finely punctured, but the punctures are distinctly visible under a lens; anterior tibiæ rufous on inner face; hind tibiæ with only a small basal cream-coloured spot; tegulæ black; second submarginal cell large and broad, first recurrent nervure meeting the intercubitus; abdomen with excessively fine punctures, the basal segment shining.

Brisbane, 8-10-18 (*Hacker*). I give a description, as no adequate account of this sex has appeared.

PROSOPIS Fabricius.

Frosopis cyaneomicans nigrescens Cockerell.

Bribie Island (*Hacker*).

Prosopis eburniella Cockerell.

Female. Brisbane, 24-9-18 (*Hacker*).

***Prosopis coronata* Cockerell.**

Male. Variety with supraclypeal mark small, tranverse, entirely red.

Brisbane, 6-10-14 (*Hacker*).

***Prosopis kelvini* Cockerell.**

Brisbane, 8-9-18, two males (*Hacker*).

***Prosopis leptospermi* n. sp.**

Female. Running in my M.S. key to *Gnathoprosopis hackeri*, but entirely different in colour of tubercles and legs, and other characters. It could also be run near *amicula*, but is quite different. Length about 7.5 mm., robust, black, with dull pale-yellow markings, consisting of cuneiform lateral face-marks (ending obtusely above, away from orbital margin), interrupted band on prothorax above (not approaching tubercles), and tubercles; legs black, the anterior tibiæ with an elongate red patch in front; mandibles sulcate, not of the broad *Gnathoprosopis* type; clypeus entirely dull, with a fine median raised line; scape long black; flagellum unusually short, very obscure reddish beneath; front dull; cheeks beneath with long white hair; mesothorax and scutellum dull, extremely finely punctured; postscutellum large; basal area of metathorax short; tegulæ black; wings dusky, with black stigma and nervures; second submarginal cell very broad, receiving recurrent nervures some distance from base and apex; more of marginal nervure is on second submarginal cell than on first; legs ordinary, spurs pale ferruginous; abdomen dull without evident punctures, first two segments laterally with very thin white hair; fifth ventral segment with a fringe of short hair, appearing pale reddish in some lights.

Sunnybank, Brisbane, at *Leptospermum* flowers, 17-9-14 (*Hacker*).

***Prosopis crassifemorata* n. sp.**

Male. Length about or hardly 6 mm., black, with the face below antennæ, and the greatly swollen upper border of prothorax (interrupted in middle), connected with and including tubercles, bright chrome-yellow; orbits converging below, face dull, clypeus very long, no supraclypeal mark; scape rather short and thick, pale at base and apex; flagellum dull pale red beneath; front dull; mesothorax and scutellum somewhat shining, very minutely punctured; metathorax rounded, not sharply truncate, with only a very narrow basal rugose band; tegulæ partly pallid; wings hyaline, very faintly dusky, stigma dark brown; second submarginal cell broad, receiving recurrent nervures near base and apex; legs black, anterior tibiæ pale red in front; hind femora very stout, covered beneath with dense white felt-like hair; hind tibiæ swollen; abdomen shining, with excessively minute punctures; venter simple.

Sunnybank, Brisbane, 19-11-13 (*Hacker*). A peculiar little species, best recognised by the hind femora. It runs to 36 in my table.

***Prosopis xanthopsyche* n. sp.**

Male. Length about 4.5 mm.; black, with the face below antennæ (the surface dull), bright chrome-yellow, including a quadrate supraclypeal mark; lateral face-marks broadly truncate above, but notched; mandibles (except tips) and labrum bright yellow; face rather broad; scape ordinary, with a yellow line in front; flagellum long, pale dull reddish beneath; upper border of prothorax (not reaching tubercles) and tubercles yellow; mesothorax and scutellum dull, not evidently punctured (the compound microscope shows minute well separated punctures on a tessellated surface); metathorax rounded, distinctly glistening above, the extreme base rugose and dull; tegulæ small and dark; wings dusky hyaline, stigma dark brown; recurrent nervures joining first and second submarginal cells near ends; second submarginal narrowed above; anterior knees, tibiæ (except a large mark behind) and tarsi, middle tibiæ at base and apex, and hind tibiæ broadly at base all yellow; middle basitarsi and basal half of hind ones yellowish-white; abdomen dullish, with a satiny lustre, venter simple.

Brisbane, 24-9-18 (*Hacker*). The specific name is fanciful, given because the yellow area of face, viewed upside down, has the outline of a moth with wings directed backward. In my table this runs to 36, but is unlike any of the species falling in that vicinity.

***Prosopis amatula* n. sp.**

Male. Length about 3.5 mm., black, slender, with the face below antennæ and narrow upward extensions along orbits, the very short (heart-shaped) scape, second antennal joint (short and transverse) and the tubercles very pale yellow; face rather broad, polished; flagellum long, very pale yellowish-red beneath; labrum and mandibles entirely pale yellow; mesothorax and scutellum shining, but minutely sculptured all over; area of metathorax broad, ill-defined, microscopically cancellate; wings hyaline, stigma sepia; first recurrent nervure joining first submarginal cell near end, second meeting outer intercubitus; legs light yellow; hind femora black, yellow at base and apex; hind tibiæ with apical half dark; abdomen slender, claviform, second segment pale red apically.

Caloundra, Q., 20-1-16 (*H. Hacker*). Runs to *P. primulipicta* Ckll. in my table, but is very distinct. It may also be compared with *P. asinalla* Ckll., but that is larger, with longer clypeus and supraclypeal area. &c. *P. bacillaria* Ckll. differs at once by the slender scape and dull mesothorax. *P. minuscula* Ckll. is readily distinguished by the scape and absence of yellow supraclypeal area. *P. pulchripes* Ckll. has a slender scape, larger (deeper) stigma, &c. Under the compound microscope the second antennal joint of *P. amatula* appears circular, about as broad as long.

***Prosopis brevior* Cockerell.**

Male. One from Caloundra, 20-1-16, taken with *P. amatula*. One Oxley, Brisbane, 17-9-14 (*Hacker*).

***Prosopis melanocephala* n. sp.**

Female. Length about 5 mm., head and thorax black, without light markings, but flagellum bright chestnut-red; legs black, the tarsi more or less reddish; abdomen shining chestnut-red, with a black patch on middle of first segment, and the other segments more or less suffused with dusky medially, the basal part of third and fourth segments slightly purplish; tegulæ black; wings hyaline, stigma black; second submarginal cell broad, receiving recurrent nervures very near base and apex; clypeus broad; face and front striato-punctate; a slender groove (visible under compound microscope) up middle of front; mesothorax dull and closely punctured; base of metathorax coarsely rugose.

Type from Darra, 14-10-13 (*Hacker*). Also from Brisbane, 14-11-12 (*Hacker*). A very distinct species, running out at 7 in my table.

***Prosopis ancorata* var. *subconstricta* n. var.**

Male. Length about 5 mm., face-marks cream-colour; first abdominal segment dark red. Very close to *P. constricta* Ckll., with the same face-markings, antennæ, &c., but abdomen black with the first segment dark red (bright chestnut-red at sides of base) and second with apical margin narrowly reddened; tubercles black with a slight red edge; wings brownish.

On flowers of *Malaleuca preissiana*, Brisbane (*Hacker*). *P. ancorata* appears distinct from *P. constricta* Ckll., but the variety now described is intermediate, and it will probably prove that all three are forms of a single species.

***Prosopis scintillans* n. sp.**

Male. Length hardly 3.5 mm., slender, clypeus, labrum, mandibles, and narrow bands along orbits (ending very slenderly about halfway up front) all white; scape and second antennal joint pale yellowish beneath, the rest of antennæ pale red beneath; head round seen from in front; mesothorax and scutellum dullish; the compound microscope shows vertex, mesothorax, and scutellum all with distinct well separated punctures on a tessellated surface; metathorax rounded, the broad base with microscopic transverse lineolation, more or less joined to form tessellation, but with no trace of plicæ or rugæ; tegulæ dark brown, wings hyaline, faintly dusky, iridescent; stigma dark brown; second submarginal cell small, recurrent nervures meeting the intercubitals; upper border of prothorax dark, but tubercles apically yellow; anterior knees and tibiæ very pale-reddish, the tibiæ with a faint dusky cloud; middle and hind tibiæ white or reddish-white at base and apex; all the tarsi light; abdomen shining reddish-black, the venter simple. There is a very small supraclypeal mark.

Brisbane, 26-9-16 (*Hacker*). Goes to 34 in my table, and appears to be close to *P. scintilla* Ckll., but with white face-markings. It may possibly be a subspecies of *Scintilla*.

The above species of *Prosopis* and *Gnathoprosopis*, none of which have the scutellum or postscutellum yellow or orange, may be separated by the following table :—

Clypeus black (females)	1.
Clypeus light (males)	7.
1. Face entirely black, abdomen blue	<i>cyaneomicans nigrescens</i> Ckll.
Face entirely black, abdomen red	<i>melanocephala</i> Ckll.
Face with light lateral marks	2.
2. Markings white	<i>eburnicella</i> Ckll.
Markings yellow	3.
3. Light colour of collar not continuous with that of tubercles	<i>leptospermi</i> Ckll.
Yellow or orange of collar continues with that of tubercles	4.
4. More than basal half of hind femora pale orange	(<i>Gnathoprosopis</i>) <i>amicula</i> Sm.
Less than basal half of hind femora pale, the colour yellowish-white	5.
5. Clypeus narrow ; first recurrent nervure meeting intercubitus (<i>Gnathoprosopis</i>)	<i>amiculina</i> Ckll.
Clypeus broad	6.
6. Larger ; first recurrent nervure meeting intercubitus	(<i>Gnathoprosopis</i>) <i>hackeri</i> Ckll.
Smaller ; first recurrent nervure falling short of intercubitus	(<i>Gnathoprosopis</i>) <i>amiculiformis</i> Ckll.
7. Antennæ entirely bright ferruginous	<i>coronata</i> Ckll.
Antennæ not so coloured	8.
8. Scape circular, with a yellow mark in front	<i>kelvini</i> Ckll.
Scape oval, entirely black	(<i>Gnathoprosopis</i>) <i>bituberculata</i> Smith.
Scape ordinary, or (in <i>P. amatula</i>) very short	9.
9. Face-marks bright orange ; orange of collar joining that of tubercles ; hind legs with tegument entirely black	<i>crassifemorata</i> Ckll.
Face-marks pale orange ; yellow of collar separated from that of tubercles ; hind legs partly yellow	<i>xanthopsyche</i> Ckll.
Face-marks pale yellow or white, not orange	10.
10. Collar bright orange, continuous with tubercles ; venter with low tubercles	(<i>Gnathoprosopis</i>) <i>simpliciventris</i> Ckll.
Collar not orange ; small species	11.
11. Scape very short, light yellow ; middle tibiæ entirely yellow	<i>anatula</i> Ckll.
Scape otherwise ; middle tibiæ at least largely dark	12.
12. A cuneiform black mark at each side of clypeus	<i>ancorata subconstricta</i> Ckll.
No such marks on clypeus	13.
13. Larger ; face-marks pale yellow or creamy-white ; supraclypeal mark well developed	<i>brevior</i> Ckll.
Smaller ; face-marks clear white ; supraclypeal mark represented by a minute transverse mark just above clypeus, hardly noticeable	<i>scintillans</i> Ckll.

BINGHAMIELLA Cockerell.

Binghamiella antipodes (Smith)

Bright, V. (*H. W. Davey*).

EURYGLOSSA Smith.

Euryglossa furcifera Cockerell.

Female. Brisbane, 15-2-16 (*Hacker*).

Euryglossa calliopsiformis Cockerell.

Female. Brisbane, 10-10-16, and 8-10-18 (*Hacker*); Logan Road, Brisbane, at *Leptospermum*.

Male. Sunnybank, on flowers of *Jacksonia scoparia* R. Br., unusually small, about 4.3 mm. long, with second submarginal cell shorter, and its upper apical angle more acute. Another male, Brisbane, 10-10-16 (*Hacker*), has the band on cheeks broader, a triangular yellow mark on the postscutellum, and the second submarginal cell more as in the female, with the first recurrent joining it far from base. Possibly the *Jacksonia* specimen should be separated, but at present I conclude that we have a single very variable species. The scutellum is dark with a variable yellow band on hind margin, and the axillæ have yellow spots.

Euryglossa terminata Smith.

I saw the type in the Saunders collection at Oxford, and noted that it was a large species, wings dilute fuliginous; fifth abdominal segment red, with golden hair. Smith's measurement, "length 4 lines," is evidently erroneous. It therefore appears practically certain that *E. hæmatura* Ckll. is identical with *terminata*.

Euryglossa depressa Smith.

A female from Portland, Victoria (*H. W. Davey*), is evidently the true *depressa* of Smith, as is shown by the broad subtriangular facial foveæ, which are described by Smith. The tarsi are dark (hind tarsal joints red at ends), not rufo-piceous as described by Smith, but the description otherwise agrees very well. The pale yellowish fulvous hair on occiput is as indicated by Smith. I noted at Oxford that *E. depressa* had clear hyaline wings and very broad abdomen; in the present specimen the abdomen is very broad (4 mm. wide), and the wings, which are 6.7 mm. long, are hyaline tinged with brown, the stigma ferruginous. The disc of mesothorax and scutellum are sparsely punctured, the punctures on the scutellum small; flagellum very obscure brown beneath, bright red at extreme tip. The mesothorax shows a broad concavity mesad of each wing, traversed by the parapsidal groove.

My *E. depressa sparsa* appears to be correctly considered a variety of this, but the species I had as *E. depressa* Sm., from Victoria, is distinct, and may be described as follows:—

Euryglossa polysticta sp. n.

Female. Length 8.5-9.5 mm.; similar to *E. depressa*, but smaller and with narrower abdomen; facial foveæ linear; flagellum dark, not red at tip; mesothorax anteriorly with very numerous minute punctures, and scutellum quite closely

punctured; wings slightly (sometimes conspicuously) brownish, stigma very dark; hair of occiput very pale yellow; abdomen dull green, hind margins of segments black; legs black, the tarsi ferruginous apically. Very close to *E. subsericea* Ckll., from Mackay, Queensland, but larger, with longer second submarginal cell, and much broader face.

Type from Dandenong, Victoria, Nov., 1902 (*T. Kershaw*). Also occurs at Croydon.

***Euryglossa hypoleuca* Cockerell.**

Mr. Hacker has discovered the female, and sends specimens from Caloundra, 20-1-16. This female resembles that of *E. albocuneata* Ckll., but is less robust, with the clypeus narrower, the cuneiform lateral face-marks longer, the lower margin of clypeus, mandibles (except tips), and labrum bright ferruginous, the antennæ (including scape) ferruginous on outer side. The knees, tarsi, and anterior tibiæ in front are red, but the hind tibiæ are white basally. The face is concave. The abdomen is without distinct banding, but the hind margins of the segments are narrowly pallid.

***Euryglossa politifrons* sp. n.**

Female. Length nearly 6 mm., with very broad abdomen; head black, with the polished, bare, hardly punctured clypeus ferruginous; supraclypeal area highly polished, dark reddish; front shining, with a median groove; scape red, with the apex intense black; labrum and basal half of mandibles reddish; mesothorax and scutellum bare, ferruginous, polished, with minute very sparse punctures; prothorax red, dusky below at sides; pleura black; axillæ much lighter red than scutellum; postscutellum and upper part of metathorax red; tegulæ ferruginous; wings hyaline, stigma and nervures dusky reddish; basal nervure falling far short of nervulus; second submarginal cell receiving first recurrent nervure far from base, the second almost or quite at apex; legs pale ferruginous, anterior and middle femora suffused with dusky above; abdomen ferruginous, with subquadrate black marks at extreme sides of the segments, apex dusky reddish.

Emerald, 1916 (*E. Allen*). Allied to *E. frenchii* Ckll., but distinguished by the red legs and clypeus, as well as the small size.

***Euryglossa occipitalis* sp. n.**

Female. Length about 10 mm., very robust; head and thorax black, abdomen very broad, ferruginous, black (with black hair) at tip, and the segments with inconspicuous biundulate dusky (somewhat bluish) bands, failing sublaterally; legs very dark brown, small joints of hind tarsi clear red. Face very broad, shining, clypeus sparsely punctured; mandibles with an orange patch on outer side before apex, and just before this a reddish area; antennæ dark, flagellum reddish beneath subapically; occiput with bright orange-fulvous hair; mesothorax and scutellum polished, sparsely punctured; tegulæ reddish; wings hyaline, slightly dusky, stigma

dark reddish, nervures fuscous: second submarginal cell long, receiving recurrent nervures some distance from base and apex; abdomen very sparsely and feebly punctured; venter light yellowish-ferruginous.

Portland, Victoria (*H. W. Davey*). Closely related to *E. victoriæ* Ckll., but without metallic colours on head and thorax, and abdomen with much more red.

***Euryglossa longicornis* sp. n.**

Male. Length about 9 mm., not very robust, black, the abdomen with a satiny lustre, and the hind margins of the segments obscurely brownish; apex of abdomen pointed. Head thick, face broad, eyes not converging below; scape robust, shining black; flagellum very long, with the first five or six joints dull ferruginous beneath: third antennal joint short, but not so short as second; face, labrum, and mandibles black; clypeus and supraclypeal area shining, with strong moderately close punctures; hair of cheeks white, of front and occiput tinged with yellowish: mesothorax truncate anteriorly, very closely punctured but shining; scutellum with stronger rather sparse punctures; tegulæ dark reddish; wings brownish, stigma and nervures dark brown: basal falling short of nervulus; second submarginal cell receiving first recurrent nervure some distance from base, but second recurrent meeting outer intercubitus; knees, anterior tibiæ, middle and hind tibiæ, except broad dusky clouds, and all the tarsi, rather deep red, the colour of the anterior tibiæ bright; abdomen with no distinct bands:

Kelvin Grove, Brisbane, 27-11-11 (*Hacker*). A distinct species, which I cannot associate with any described female. It must be rare at Brisbane, as the specimen taken in 1911 remains unique.

***Euryglossa walkeriana* Cockerell.**

Female. Brisbane, 12-9-16 (*Hacker*). Previously known only by the unique type, collected at Launceston, Tasmania. It seems to be a little smaller than the type, and the hind margin of the first abdominal segment is red.

***Euryglossa neglectula* subsp. *mica* Cockerell.**

Female. Brisbane, 20-9-16 (*Hacker*). Male. Brisbane, 3-10-16 (*Hacker*). Typical *neglectula* was described from "Australia" from an old specimen in F. Smith's collection.

***Euryglossa reginæ* Cockerell.**

Male. Brisbane (*Hacker*); Ebor, N.S.W., 1-1-16, a variation with the flagellum dark, reddened only at base beneath.

Euryglossa nubifera sp. n.

Male. Length about 6 mm., black, the head and thorax with rather abundant dull white hair, and no light markings; face broad but orbits converging below; clypeus dullish, with long pale hair, not conspicuously punctured; mandibles dark red apically; front dull; facial foveæ linear; antennæ long and rather thick, flagellum obscure reddish beneath; mesothorax and scutellum dullish, without evident punctures (the compound microscope shows a minutely tessellate surface); tegulæ dark, with broad reddish margin posteriorly; wings hyaline, faintly dusky, beautifully iridescent, with a large fuliginous apical cloud; stigma pale reddish with dark margin, nervures fuscous; second submarginal cell large, receiving recurrent nervures not very far from base and apex; femora black with red knees; tibiæ and tarsi bright ferruginous, the hind ones strongly infuscated posteriorly; first three abdominal segments dull black, with the broad hind margins (that on first reddish) shining; rest of abdomen shining; apex with a red spoon-shaped plate; venter red, the second and third segments with dark transverse bands.

Coolangatta, Queensland, 7-9-13 (*Dr. A. J. Turner*). Easily recognised by the clouded apices of anterior wings.

A female from Coolangatta, of the same date, was set apart as an entirely different species, but on closer inspection it is evidently *nubifera*. It is nearly 8 mm. long, much more robust than the male, and the strongly dusky (brownish) wings have the apical cloud indistinct though perceptible. The outer intercubitus has an angle at the middle, from which proceeds an appendicular vein, and there is another similar short appendicular vein near its lower end. These are only slightly indicated in the male. The legs are coloured as in the male, except that the hind tibiæ are black, and their tarsi largely black. The face is broad, not hairy, the clypeus with very few weak punctures. Flagellum ferruginous beneath except at base; mandibles with only a faint suggestion of red near apex; facial foveæ linear. The abdomen has the first two segments dull, except the margins, the others shining. The mesothorax and scutellum are dullish, without distinct punctures. There is black hair on the abdomen just below the apex.

Euryglossa jucunda Smith.

Female. Ebor, N.S.W., 1-1-16. Length about 7 mm.; sides of face with much white hair; tegulæ dark reddish-brown; stigma same colour as tegulæ; only mall joints of tarsi red. This is what I have determined as *jucunda*, but it is possible that actual comparison with the type from Western Australia would show that the form from New South Wales and Queensland is separable. It is also possible, judging from Smith's account, that the original *jucunda* was a mixture of two species.

The following key will facilitate the separation of the species of *Euryglossa* in the present collection. I have also added the species of *Pachyprosopis* :—

Abdomen red	1.
Abdomen not red	2.
1. Mesothorax red	<i>E. politifrons</i> Ckll.
Mesothorax black; wings hyaline	<i>E. occipitalis</i> Ckll.
2. Mesothorax dark green	<i>E. walkeriana</i> Ckll.
Mesothorax yellow	<i>E. furcifera</i> Ckll.
Mesothorax black, marked with yellow; clypeus yellow	3.
Mesothorax entirely black	5.
3. Scape dark; clypeus with two dark spots; a yellow spot on front	<i>E. calliopsiformis</i> Ckll. ♀
Scape yellow, at least in front	4.
4. Axillæ spotted with yellow	<i>E. calliopsiformis</i> Ckll. ♂
Axillæ entirely black	<i>P. humeralis</i> Ckll.
5. Face with light markings	6.
Face entirely black	7.
6. Legs mainly black; region of mouth red	<i>E. hypoleuca</i> Ckll.
Legs yellow; cheeks black	<i>P. aurantipes</i> Ckll.
7. Males; antennæ long and slender	8.
Females; antennæ shorter	13.
8. Large species, about 9 mm. long	<i>E. longicornis</i> Ckll.
Much smaller	9.
9. Flagellum light red beneath	10.
Flagellum dark	11.
10. Apex of abdomen red	<i>P. barbata</i> Ckll.
Apex of abdomen not red	<i>E. reginæ</i> Ckll.
11. Wings with a conspicuous apical cloud	<i>E. nubifera</i> Ckll.
Wings without an apical cloud	12.
12. Larger; hind tibiæ largely red	<i>E. reginæ</i> Ckll., var.
Smaller; hind tibiæ without red	<i>E. neglectula mica</i> Ckll.
13. Large and robust; anterior wing about 7 mm. long; abdomen greenish	<i>E. depressa</i> Smith.
Much smaller	14.
14. Abdomen metallic; only small joints of tarsi red	<i>E. jucunda</i> Smith.
Abdomen not metallic; tarsi largely red or nearly all red	15.
15. Larger; middle tibiæ red in front	<i>E. nubifera</i> Ckll.
Smaller; middle tibiæ black	<i>E. neglectula mica</i> Ckll.

PACHYPROSOPIS Perkins.

Pachyprosopis aurantipes Cockerell.

Brisbane, 3-10-12 (*Hacker*).

Pachyprosopis humeralis Cockerell.

Oxley, Brisbane, 24-9-14 (*Hacker*).

Pachyprosopis barbata Cockerell.

Male. Sunnybank, Brisbane, 19-11-13 (*Hacker*); Tambourine, 23-10-12.

CERATINIDÆ.

NEOCERATINA Perkins.

Neoceratina australensis Perkins.

Glen Innes, N.S.W., April 28, 1916. One female. The mesothorax and scutellum are dark-green. Previously known from Queensland.

EXONEURA Smith.

Exoneura insularis Cockerell.

Stradbroke Island, five females, Sept. 17, 1915 (*Hacker*).

Exoneura bicolor Smith.

Armidale, N.S.W., 5-2-15, two females; Stanthorpe, Q., 6-11-14, one female.

Exoneura nitida n. sp.

Female. Length about 6 mm.; black, with the margins of the fourth and fifth abdominal segments very narrowly and often hardly perceptibly reddened; eyes rather pale purplish-brown; face and front highly polished and shining; face broad, orbits slightly converging below; clypeus with a very broad creamy-white band, broadest above where it occupies the whole width of the clypeus; flagellum obscurely brownish beneath; thorax and first three segments of abdomen smooth and shining; tubercles cream-colour; tegulæ black; wings dilute brown, stigma and nervures very dark; under side of thorax with short pale hair; hind tibiæ and tarsi with much black hair.

Male. Length about 6 mm.; similar to this sex of *E. aterrima*, but larger, head broader, eyes larger, reddish-brown; white (creamy-white) area on face broader; wings browner. The face is bare, except for a very scanty short pale pubescence.

Stradbroke Island, Q., Sept. 17, 1915, four females, 1 male (*Hacker*). Very close to *E. aterrima* (Ckll.) but larger, with brownish wings and black legs. Also near *E. botanica* Ckll., but differing in the legs and other characters.

Exoneura robusta n. sp.

Female (Type). Length about 6.5 mm.; robust, black, the very broad abdomen shining dark chestnut-red; with the first segment (except apical margins laterally), nearly all of second, and a transverse arched band on third, black; face very broad, orbits not converging; clypeus with a broad cream-coloured band, which in the type specimen is urn-shaped and pointed below, but in others variable, hooked at

sides above, and reaching clypeal margin below the sides irregular; mandibles dark reddish in middle; antennæ dark; mesothorax dullish, not highly polished; tubercles black, with a fringe of grey hair; tegulæ black, reddish posteriorly; wings strongly reddened; stigma dusky red, margined with darker; nervures fuscous; venter of thorax with shining white hair; hair on hind tibiæ and tarsi reddened anteriorly.

Male. Length about 6.5 mm.; more slender, with the usual male characters. Face narrow, with long black hair, and no light markings; stigma narrower and darker; tibiæ apically, and all the tarsi red; abdomen darker, even the apical segments suffused with black. This is possibly a different species, but probably belongs here.

National Park, Q., Dec., 1919, four females, one male (*Hacker*). Close (♀) to *E. hamulata* Ckll., with the same broad face, but easily distinguished by the much darker legs, only partially and very obscurely reddened, if at all. The abdomen also is much darker. The male is remarkable for the entirely black face.

***Exoneura baculifera* n. sp.**

Female. Length somewhat over 6 mm., but smaller than *E. robusta*; black, robust, with the broad abdomen dark chestnut-red, the first two segments mainly black, and a transverse dusky cloud on third; knees, anterior and middle tibiæ apically, and their tarsi, rather dusky-red; clypeus with a narrow rod-like pale yellow stripe, often subobsolete; orbits converging below; antennæ dark; tegulæ piceous, reddest behind; wings strongly brownish, or reddish, stigma and nervures dusky ferruginous; tubercles dark; hind tibiæ and tarsi with much black hair, shining reddish at apex of tibiæ.

National Park, Q., Dec., 1919, five females (*Hacker*). Allied to *E. angophoræ oblitterata* Ckll., but easily separated by the dark legs and abdomen. It is to *oblitterata* what *robusta* is to *hamulata*.

***Exoneura excavata* n. sp.**

Female. Length about 7.5 mm.; black, with the abdomen dark chestnut-red, the first segment with a broad blackish suffusion on disc; anterior knees, tibiæ apically, and all the tarsi dark red; in certain lights the middle and hind tibiæ appear to be bright red above, but this is due to remarkable coppery hair; the hair on hind tarsi is also red, subappressed; face broad, excavated and basin-like, shining (though the clypeus is minutely punctured), wholly black; labrum convex, dark red; mandibles reddish; antennæ entirely dark; mesothorax and scutellum polished; tubercles black; hair on under side of thorax pale reddish; tegulæ piceous; wings strongly reddish; stigma dusky-red with darker margin, nervures dusky-reddish; apical part of abdomen with short red hair.

National Park, Q., Dec., 1919, one female (*Hacker*). A remarkable species, easily known by the black excavated face.

***Exoneura diversipes* n. sp.**

Male. Length about 7 mm. ; black, the knees, tibiæ at extreme apex, and middle and anterior tarsi pale reddish, hind tarsi dark reddish ; eyes very large, converging below ; face with a very broad reversed T of greenish-white, including all of clypeus except a narrow stripe down each side ; lateral marks represented by short slender lines running up from the ends of the arms to the T ; labrum greenish-white ; face with long black hair ; antennæ entirely black ; hair of head and thorax above long, brownish-black, pleura with blackish hair, under side of thorax with white ; tegulæ black ; wings hyaline, stigma and nervures clear ferruginous ; all the femora, and anterior tibiæ, and tarsi slender, hind tibiæ slender basally and broad apically, their basitarsi long and very thick.

National Park, Q., Dec., 1919, three males (*Hacker*). Very distinct from all described males, and I know of no female to which it could be assigned.

***Exoneura rhodoptera* n. sp.**

Female. Length about 6 mm. ; very robust, black, with the abdomen marked with dark red, at sides of first and second segments, a pair of hook-shaped marks on second segment, a transverse band (weak or broken sublaterally) on third, base of fourth, and an indistinct transverse band on fifth ; face broad, orbits parallel ; clypeus with a broad median cream-coloured bar, irregular along the margins, and emitting at the upper end very long hook-like extensions, the whole upper margin of clypeus being narrowly pale ; on each side of the lower end of the pale bar is a reddish area ; no lateral face-marks ; labrum black ; flagellum obscure reddish beneath ; tegulæ reddish ; wings strongly reddish-fuliginous, stigma and nervures dark-reddish ; tubercles black ; femora with a pale red stripe above, not reaching base ; anterior and middle tibiæ and tarsi dark red ; hind legs darker.

Stradbroke Island, Q., Sept. 17, 1915, one female (*Hacker*). Allied to *E. hamulata* Ckll., but with very much darker abdomen, legs, and wings.

***Exoneura perpensa* n. sp.**

Male. Length about 6 mm. ; head and thorax black, with long hair, black on head, dull white on thorax, very faintly yellowish dorsally ; head transverse ; eyes very large and convex, face narrower, in middle hardly so broad as an eye ; clypeus and labrum greenish-white, the light facial area like a reversed wineglass with an extremely thick stem ; no lateral marks ; antennæ black ; mesothorax and scutellum not highly polished ; tegulæ dark ; wings hyaline, faintly reddish, pale clear red at base ; stigma narrow, ferruginous ; nervures ferruginous ; basal nervure strongly arched, falling far short of nervulus ; femora and anterior and middle tibiæ and tarsi slender ; hind tibiæ claviform, their basitarsi long and thick ; knees, anterior tibiæ except basal half behind, hind tibiæ in front and apically behind, hind tibiæ at apex in front and anterior and middle tarsi all light ferruginous ; abdomen parallel-sided, broad at base (slender basally in *bicolor*), first segment black, second black

4. Face with long black hair	<i>diversipes</i> Ckll.
Face without long hair	<i>nitida</i> Ckll.
5. Abdomen bright red, with thin short orange hair on apical part	<i>bicolor</i> Smith.
Abdomen dusky or dark red, or partly reddened	6.
Abdomen black, or slightly reddened	10.
6. Face concave, depressed, entirely black	<i>excavata</i> Ckll.
Face not entirely black; if nearly all black, not concave	7.
7. Face with lateral cream-coloured spots; abdomen very broad, reddish ..	<i>insularis</i> Ckll.
Face without lateral spots	8.
8. Clypeal mark broad, or with lateral hook-like extensions at upper end ..	9.
Clypeal mark a simple narrow stripe, not always well defined	<i>baculifera</i> Ckll.
9. Legs largely reddened; hook-like extensions of clypeal mark very long ..	<i>rhodoptera</i> Ckll.
Legs black, at most knees reddish, or tibiae and tarsi obscurely reddened; face-marks variable	<i>robusta</i> Ckll.
10. Face with light lateral spots; flagellum pallid beneath	<i>insularis</i> Ckll.
Face without light lateral spots	11.
11. Face-mark a narrow subobsolete stripe	<i>baculifera</i> Ckll.
Face-mark broad, or with lateral extensions above	12.
12. Anterior and middle femora with a red stripe above	<i>rhodoptera</i> Ckll.
Anterior and middle femora without such a stripe	13.
13. Tubercles entirely black, densely fringed with grey hair	<i>robusta</i> Ckll.
Tubercles largely light; legs black	<i>nitida</i> Ckll.

MELIPONIDÆ.

TRIGONA Jurine.

Trigona cassiæ Cockerell.

Workers from Brisbane, 8-2-16 (*Hacker*), and Caloundra, 20-1-16. (*Hacker*). One of the Brisbane specimens has a dark red abdomen, but it is certainly conspecific, and possibly not fully matured.

Trigona læviceps Smith.

Many years ago I recorded *Trigona canifrons* Smith from Adelaide R., Australia, basing my identification on comparison with specimens from Ceylon, received from Mr. E. E. Green as *canifrons*. Unfortunately the Ceylon specimens were really *T. læviceps* Sm., and not *canifrons* at all. A specimen now before me, from Gordonvale, N.Q., June, 1918, collected in the scrub by Edmund Jarvis, is identical with the so-called *canifrons* of Australia. I am quite unable to clearly separate it from *læviceps*, though it is rather slender, with the abdomen dark sepia-brown, becoming black apically. Possibly a larger series would indicate a distinct form, but I am inclined to think that we have the Indian *læviceps* probably accidentally introduced into Australia. Bingham states that it builds in crevices in the walls of houses, so it seems quite possible that a nest might be carried with some kind of merchandise. The red antennæ distinguish it from the allied and certainly native *T. carbonaria* Smith.

ON THE EMERGENCE OF TWO TUBE-DWELLING HOMOPTEROUS INSECTS.

BY HENRY HACKER, F.E.S.

(Plates XVII and XVIII).

PECTINARIOPHYES PECTINARIA Kirk.

A good account of the calcareous tubes made by this and an allied species, together with the curious nymphs that inhabit them, was given by F. Ratte,¹ in 1884; but the method of emergence was very briefly mentioned by this author. Kirkaldy² in 1906, placed these insects in the subfamily *Cercopinae* and erected two new genera *Polychaetophyes* and *Pectinariophyes* for their accommodation. Subsequently³ he placed them in the subfamily *Machærotinae*.

These calcareous tubes have been frequently observed by me, attached to small Eucalyptus saplings, and during the last two years I have included them amongst other studies in the life histories of Australian Homoptera. As far as I am aware the final ecdysis of these insects is not paralleled by that known of any other group. All the tubes seen, however, do not contain living nymphs, as those deserted in previous seasons, owing to their durable nature, remain on the twigs for an indefinite time. The empty tubes have a bleached appearance in comparison with those that are occupied. The occupied tubes contain a clear liquid, and in it the nymphs live submerged with their heads downwards. Their suctorial apparatus is inserted through a longitudinal slit on the inner side of the tube into the twig to which the tube is attached.

The first indication that the insect is about to emerge is the appearance of small bubbles at the mouth of the tube. This occurs in early spring, generally in the evening or at night. Viewed through a lens at this stage, the posterior end of the nymph is seen continually moving from side to side; this end protrudes for about a second, evidently to obtain a supply of air, and then retracts, after which fresh bubbles are blown; this renewing of the air supply takes place at intervals. The operation continues for about an hour, by which time a large mass of froth has been produced, covering the mouth of the tube and hanging over the side. When about to emerge, the nymph forces its way to the top of the tube, protruding its posterior end first until the legs have reached the lip. It then swings itself over, and with the head now upward it climbs down the outer side of the tube until it is merged

¹ Proc. Linn. Soc. N.S.W., Vol. IX, p. 1164, 1884.

² Bull. Haw. Sugar Plant. Exp. Sta. i, pp. 384-386, 1906.

³ Bull. Haw. Sugar Plant. Exp. Sta. xii, p. 10, 1913.

into the froth which has accumulated on the lower side. There is constant movement inside the mass of froth caused by the insect getting out of its nymphal skin. The froth now gradually subsides; all movement has ceased, and the newly-emerged insect is seen clinging to the empty nymph skin, which in turn is clinging to the side of the tube.

The pale-yellow wingless insect remains quite motionless. After a short interval tiny tegmina and wingbuds begin to appear. These expand rapidly, and in half an hour from the time they were first seen are fully developed. While this growth develops, and for some time after, the wings hang down perpendicularly; they are then suddenly flexed once or twice, and closed to their normal roof-like position. At this stage, though rather soft, the insect is able to walk and jump, but if left undisturbed it will remain quietly on the twig until the next day.

The time occupied by the metamorphosis of this insect is about an hour, and the total period from the first appearance of the froth, about two hours. The capture of adult specimens by me, in September and January, proves that there are two broods a year.

POLYCHÆTOPHYES SERPULIDIA Kirk.

This insect occurs in the Brisbane district, but more sparingly than the previous species. The tubes differ from that species in their larger size, darker colour, and the transverse serrated lines, which give them a coarser texture. They are invariably attached to the twigs for their entire length, while in the previously mentioned species, the upper part of the tube is always bent out away from the twig. This causes a slight difference in the method of exit between the two species. When the froth is coming from the tube it often runs down the twig instead of the tube, dependent on the angle at which the twig is inclined. The emerging nymph following the froth consequently often clings to the twig instead of the tube to undergo its metamorphosis. When this occurs, the insect immediately after emergence generally walks a little way up the twig and there stops while its wings develop. In other respects its method of emergence is similar to that of *Pectinariophyes pectinaria*, and the time occupied is about the same.

F. Ratte remarks:—"In the dry parts of the interior it is probable that the water contained in these shells is resorted to for drinking by the ants so numerous in Australia, as if it was a speciality among the small homopterous insects to provide during their life for the Formicidæ." All the evidence which I have acquired in the coastal district is against the above opinion; no ants have been seen drinking the liquid, nor were any noticed in the vicinity of the tubes. It is well known that many Coccidæ, Membracidæ, &c., excrete liquids which are eagerly sought by ants. In return the Homoptera receive certain services from the ants, so the benefit is reciprocal; but in the case of these soft tube-dwelling nymphs it would be of no service to be robbed of their protective liquid, without which they would speedily perish.

REMARKS ON THE ILLUSTRATIONS.

(Plates XVII and XVIII.)

Pectinariophyes pectinaria Kirk.—Figs. 1, 2, 3, and the upper insect in fig. 4.
Polychætophyes serpulidia Kirk.—Figs. 5, 6, 7, 8, and the lower insect in fig. 4.
Figs. 1 and 5 show the first appearance of the nymphs of both species, while forcing their way, posterior ends first, out of their tubes. The next stage is shown at fig. 6, where the nymph is clinging to the twig, while its skin is about to split longitudinally up the back. In figs. 2 and 7, the upper portion of the insects are free, while they are supported by their lower parts which are still enclosed in the nymphal skins; the wings are seen beginning to develop. Figs. 3 and 8 show the fully developed insects resting in their characteristic positions. In fig. 8, a circular anal plate can be seen on the empty nymph skin; it is peculiar to this species, and is used by the nymph as an operculum to close the mouth of its tube.



Fig 1.

x 3 diam.



Fig. 2.

x 3 diam.



Fig 3.

x 3 diam.



Fig 4.

x 5 1/2 diam.



Fig. 5.

x 3 diam.

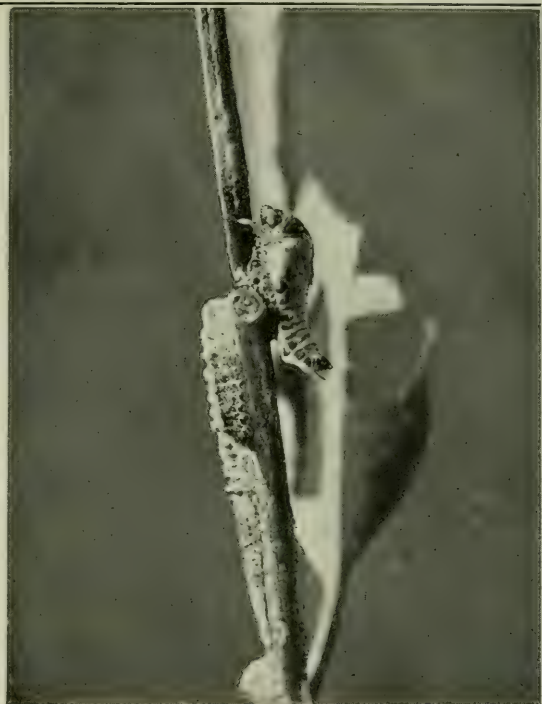


Fig. 6.

x 3 diam.

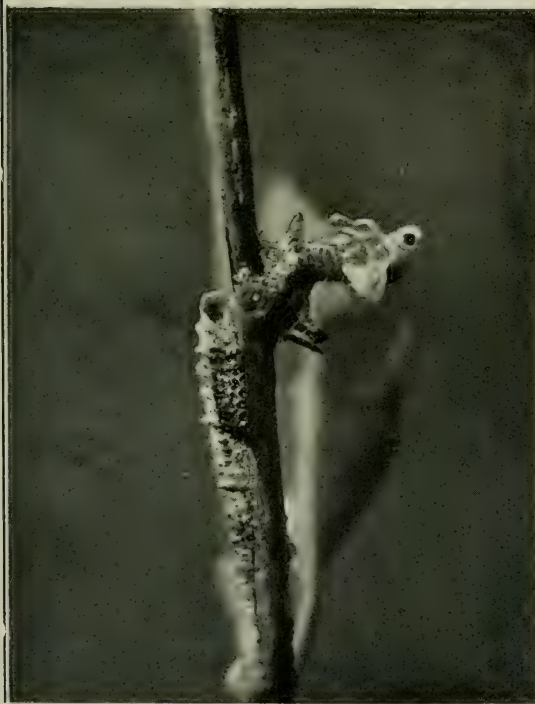


Fig. 7.

x 3 diam.

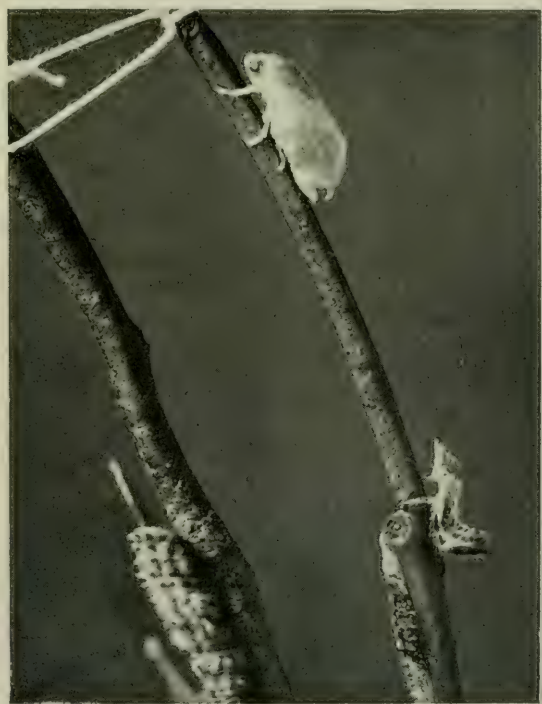


Fig. 8.

x 3 diam.

EMERGENCE OF TUBE-DWELLING HOMOPTERA, Hacker.

SOME AUSTRALIAN WASPS OF THE GENERA ZOYPHIUM AND ARPACTUS.

By HENRY HACKER AND T. D. A. COCKERELL.

FAMILY CRABRONIDÆ.

SUBFAMILY PARANYSSONINÆ.

GENUS ZOYPHIUM Kohl.

The genus *Zoyphium* Kohl, based on a single species as recently as 1893, is now found to include a large number of Australian forms, presenting excellent specific characters. The following table separates those at present known, but it cannot be doubted that many others will be found when collectors in various parts of Australia interest themselves in these small wasps :—

Females	.. .. .	1.
Males	.. .. .	15.
Two cubital cells in anterior wings	.. .. .	<i>frontale</i> Turner.
Three cubital cells	.. .. .	1.
1. First abdominal segment with a tooth or tubercle on each side	.. .. .	.. .. .
First segment without such teeth	.. .. .	3.
2. Clypeus with two small teeth on each side	.. .. .	<i>sericeum</i> Kohl.
Clypeus with one tooth on each side; first abdominal segment campanulate, not truncate, with a pair of basal keels, and a small tubercle on each side not far from base	.. .. .	<i>flavofasciatum</i> Turner.
3. Abdomen black in middle and pallid at either end, its basal segment very short and broad, abruptly truncate; clypeus without lateral teeth	.. .. .	<i>dipteroideus</i> Turner.
Abdomen red in middle	.. .. .	4.
Abdomen black, or with hind margins of segments more or less red	.. .. .	7.
4. First abdominal segment black, with red hind margin; pronotum black; clypeus cream-colour	.. .. .	<i>ornatum</i> n. sp.
First abdominal segment red	.. .. .	5.
5. Upper margin of pronotum yellow, scutellum and postscutellum mainly red	.. .. .	<i>collare</i> n. sp.
Pronotum black; scutellum and postscutellum without red	.. .. .	6.
Mesonotum dark blue	.. .. .	<i>erythrosoma</i> Turner.
Mesonotum black	.. .. .	<i>splendidum</i> n. sp.
7. Pronotum with an interrupted cream-coloured band above; mesonotum faintly brassy, very finely and closely punctured	.. .. .	<i>funebre</i> Turner.
Pronotum with upper margin wholly dark	.. .. .	8.
8. Antennæ red or pale brownish	.. .. .	9.
Antennæ wholly or mainly black	.. .. .	10.
9. Legs bright yellow	.. .. .	<i>affine</i> n. sp.
Legs pale ferruginous brown	.. .. .	<i>Kohlîi</i> Turner.*

* In his key, Turner says that ♀ *kohlîi* has no clypeal teeth, but his descriptions indicate a single short tooth on each side.

10. Pronotum strongly emarginate in middle above	11.
Pronotum not emarginate	12.
11. Tibiæ entirely red	<i>emarginatum</i> n. sp.
Tibiæ not red	<i>nigrum</i> n. sp.
12. Legs mainly black, not red or yellow	<i>argyreum</i> n. sp.
Legs red	13.
13. Wings strongly dusky	<i>fuscipenne</i> n. sp.
Wings clear hyaline	14.
14. Face with golden hair	<i>crassicornæ</i> Ckll.
Face without golden hair	<i>iridipenne</i> Turner.
15. (Males) Abdomen red	16.
Abdomen pallid, with a broad median black band	<i>flavofasciatum</i> Turner.
Abdomen black, or with hind margins of segments red	19.
16. Very small, about 4 mm. long; upper margin of pronotum reddened	<i>pusillum</i> n. sp.
Much larger; upper margin of pronotum not reddened	17.
17. Mesonotum dark-blue	<i>erythrosoma</i> Turner.
Mesonotum black	18.
18. First abdominal segment black, with hind margin red	<i>ornatum</i> n. sp.
First abdominal segment red	<i>splendidum</i> n. sp.
19. Mesonotum red	<i>rufonigrum</i> Turner.
Mesonotum black	20.
20. Pronotum strongly emarginate in middle above	21.
Pronotum not emarginate	22.
21. Tibiæ entirely red	<i>emarginatum</i> n. sp.
Tibiæ not red	<i>nigrum</i> n. sp.
22. Legs bright ferruginous	<i>crassicornæ</i> Ckll.
Legs yellow	23.
23. Front with silvery hair	<i>affine</i> n. sp.
Front with golden hair	<i>doddi</i> Turner.

Z. rufipes Rohwer is omitted, as it is a *Sericophorus*.

The material of this genus in the Queensland Museum shows uniformity in most structural characters. Where these are very close, as between *Z. emarginatum* and *Z. nigrum* or *Z. erythrosoma* and *Z. splendidum*, there are well marked colour differences by which the forms may be easily separated. Colour characters seem constant and may be used with more confidence in this genus than in some others of the Crabronidæ.

In most of the species where both sexes are known, the females possess two pairs of teeth on the apical margin of the clypeus, while they are absent in the males. Several species of which but one sex is known are in agreement and may be included eventually in the above group. A few species, however, show a different arrangement. *Z. flavofasciatum* has one pair in each sex; *Z. argyreum* has one pair in the female; *Z. dipteroides* is said to be without teeth in the females. In a few males there is a slight angulation on the clypeal margin, but this is not considered to be within the meaning of the term "tooth."

ZOYPHIUM CRASSICORNE Ckll.

Female. Length 6 mm.; differs from the male in the colour of the clypeus, the basal half of which is blackish, with a pale ferruginous band along the apical margin; the apical edge has two small dark-coloured teeth close together on each side.

Hab.—Brisbane (*Hacker*), October and February.

ZOYPHIUM FLAVOFASCIATUM Turn.

Female. This sex differs from the male in its larger size, length $10\frac{1}{2}$ mm. exp. 19 mm. The pygidial area is triangular, narrowly rounded at the apex, and clothed with short, stout hairs. It corresponds to the male in colours and markings, also in possessing a single tooth on either side of the apical margin of the clypeus.

Hab.—Brisbane (*Hacker*), November.

ZOYPHIUM EMARGINATUM new species.

Female. Length 8 mm. Head and thorax finely punctured, the entire face covered with brilliant silver pubescence ending abruptly, with rounded outline, at sides, a little above level of antennæ, but in certain lights the front also appears silvery; ocelli inserted in slight depressions, the posterior pair twice as far from each other as from the eyes; antennæ clavate, the apical joint large, obliquely truncated, the truncation excavated; sides of prothorax rather depressed, the central part produced with a large triangular emargination in the middle; the apical edge of the clypeus has two small teeth on each side. Median segment with a short longitudinal carina which ends in a somewhat circular shining depression; basal area with diagonal striæ which are strongest at the base; the posterior truncation is very finely punctured, the sides with silver pruinose pubescence. Dorsal abdominal segments very finely punctate, clothed with fine golden pruinose pubescence, sides of first segment silvery, the ventral segments smooth, shining, with a few scattered punctures, the apical edges thinly ciliate. Pygidial area reddish, triangular, flattened dorsally and broadly rounded apically. Second submarginal cell pointed on the radial nervure, receiving the second recurrent nervure at one-third from the apex; first recurrent nervure received at about the same distance from the first submarginal cell; posterior tibiæ with fine, short spines on the outer edge.

Black, mandibles at base, the first to fourth joints of all tarsi very pale flavus; enlarged apical tarsal joints, tibiæ, apex of anterior femora, intermediate and posterior femora except at base, light ferruginous; undersides of apical antennal joints bright ferruginous; apical bands of abdominal segments, testaceous; tegulæ rufous; pulvilli black; wings hyaline, slightly dusky, noticeably so at apex; iridescent, nervures and stigma dark-brown.

Male. Length 6 mm. Apical edge of clypeus without teeth; the triangular emargination in the middle of prothorax as in the female; apex of the last abdominal segment with two small projections at the sides, narrowly emarginate in the middle.

Hab.—Brisbane (*Hacker*), September, October.

ZOYPHIUM NIGRUM new species.

Female. Length 6 mm. Clypeus transverse, convex in the middle, the apical margin with two teeth on each side; clypeus and the lower half of face clothed with silver pubescence; ocelli nearly twice as far from eyes as the diameter of one; antennæ clavate, the fourth and following joints broader than long; apical joint large, obliquely truncated and excavated, not nearly so massive as in *Z. emarginatum*. Prothorax rather produced in the centre where it is triangularly emarginate; thorax and scutellum finely punctured; median segment finely diagonally striated, with a short longitudinal carina which ends in a shining circular depression, short white pubescence at the sides of segment. Abdomen finely punctured, clothed with thin white pubescence, the apical segment triangular, more coarsely punctured and covered with short grey hair; second submarginal very narrow on the radial nervure, receiving the second recurrent nervure past the middle, the first recurrent nervure is received at about the same distance from the first transverso-cubital nervure as the second recurrent is to the second transverso-cubital nervure.

Black, base of mandibles, part of tubercles, tibial spines, second, third, and fourth tarsal joints sordid white; tegulæ, tibiæ, first and fifth tarsal joints fuscous; antennæ largely ferruginous beneath; wings hyaline, iridescent, faintly dusky apically, nervures and stigma fuscous.

Male. Length 5 mm. Apical margin of clypeus without teeth; apical abdominal segment triangular, narrowly rounded at apex.

Hab.—Brisbane (*Hacker*), October. Caloundra (*Hacker*), September, on tree-trunk.

ZOYPHIUM ARGYREUM, new species.

Female. Length $4\frac{1}{2}$ mm. Clypeus transverse, the apical margin with one tooth on each side; face the same width on the vertex as on the clypeus, clothed with silver pubescence. Prothorax slightly produced in the middle, without an emargination, lined dorsally with silver pubescence. Mesonotum and scutellum finely punctured; median segment very finely diagonally striated, entirely clothed with silver pubescence, thickest at the sides; area with a longitudinal shining sulcus widened and rounded apically. Abdomen microscopically punctured and thinly clothed with whitish pubescence; pygidial area triangular, more coarsely punctured, and clothed with short dark hairs. Second recurrent nervure received about one-fifth from the base of the second submarginal cell; the first received at about an equal distance from the apex of the first submarginal cell.

Black, base of mandibles, the whole of the clypeus, underside of scape, tubercles, apex of anterior femora, anterior tibiæ, the spurs, and the tarsal joints sordid white. Mandibular teeth, a narrow line on the apical clypeal margin, tegulæ, an obscure apical band on first abdominal segment ferruginous, antennæ black, obscurely fulvous beneath; pulvilli black.

Hab.—Birkdale, near Brisbane (*Hacker*), February. At flowers of *Lomatia silaifolia* R.Br.

ZOYPHIUM COLLARE, new species.

Female. Length 8 mm. Head and thorax finely punctured; face narrower at vertex than at clypeus, clothed with silver pubescence which extends up the sides of the front; clypeus with two distinct teeth on each side; posterior ocelli closer to the eyes than the diameter of one; apical joint of antennæ not wider than the preceding joint; a deep foveolate groove at the base of the scutellum, anterior to which there is a transverse band of pale yellow pubescence; median segment finely punctate striate, with a shallow longitudinal sulcus containing a short carina; at its apical end there are a few transverse striæ in a depression surrounded by a kidney-shaped swelling. Abdomen finely punctured; apical segment with coarser punctures, and short reddish hair. Second submarginal cell pointed on the radial nervure, receiving the second recurrent nervure slightly beyond the middle.

Black, base of mandibles, clypeus, scape (except a pale red patch above) and thickened upper border of prothorax creamy-white; scutellum and post-scutellum rufescent; flagellum (except dusky apex), abdomen, femora, and tibiæ ferruginous; a large creamy-white shining space on apical part of anterior femora beneath; spurs whitish; tarsi pale reddish, with dark pulvilli; nervures and stigma fuscous.

Hab.—Birkdale, near Brisbane (*Hacker*), February. At flowers of *Lomatia silaifolia*.

ZOYPHIUM ORNATUM, new species.

Female. Length 8 mm. Face narrower at vertex than at clypeus, sides straight; clothed with silver pubescence; clypeus with two teeth on each side; posterior ocelli nearly twice as far from each other than from the eyes; apical joint of antennæ not wider than the preceding joint; mesonotum and scutellum opaque, finely and closely punctured; a deep foveolate transverse groove at the base of the scutellum with a little silver pubescence at each end; median segment dorsally diagonally striated, with a central longitudinal carina, which ends in a shallow shining sulcus; basal abdominal segments shining, minutely punctured; apical segments clothed with thin golden pubescence; pygidial area triangular, clothed with short hairs; second submarginal cell pointed on the radial nervure, receiving the second recurrent nervure well beyond the middle.

Black, base of mandibles, and clypeus creamy-white; scape and apex of femora, very extensive on anterior pair, pale yellow; tibiæ and tarsi pale reddish, the anterior tarsi with a yellow stripe; flagellum except dark apex, apical border of first, and all of the remaining abdominal segments ferruginous.

Male. Length 7 mm. Clypeus without teeth, black with a rather obscure yellow spot on each side near the middle; hypopygium ending in an acute spine, with an acute spine on either side; first abdominal segment, except the apical band, black, as in the female.

Hab.—Birkdale, near Brisbane (*Hacker*), February. At flowers of *Lomatia silaifolia*.

ZOYPHIUM PUSILLUM, new species.

Male. Length 4 mm. Clypeus wide, the margins somewhat sinuate, without teeth; face clothed with thin white pubescence; front rather prominent, convex, finely and closely punctured; joints of antennæ broader than long, the apical joint not wider than the preceding joint; ocelli not twice as far from each other than from the eyes; mesonotum and scutellum finely punctured; median segment finely diagonally striate-punctate with a longitudinal carina which ends in a shallow shining transverse crescent apically. Abdomen shining, minutely punctured, with thin pubescence on the apical segments; hypopygium truncate, with a small blunt apical spine, and one at each side near the apex. Second recurrent nervure received a little beyond the middle of the second submarginal cell, the first received a smaller distance from the apex of the first submarginal cell.

Black, base of mandibles, clypeus, and tarsal joints cream-colour, tegulæ testaceous; tubercles, upper border of prothorax, legs, and abdomen ferruginous; flagellum red, dusky above; wings hyaline, iridescent, slightly dusky apically, nervures brown.

Hab.—Brisbane (*Hacker*), October.

ZOYPHIUM SPLENDIDUM, new species.

Female. Length 9 mm. Head finely punctured, orbits converging above; ocelli half as far again from each other as from the eyes; joints of antennæ gradually increasing in size, apical joint conical, as long as the two previous joints; clypeus convex, porrect at the apex, with two teeth on each side; clypeus and face clothed with silver pubescence. Thorax opaque, very finely and closely punctured; prothorax rather narrow; depressed below the level of the mesonotum; a deep foveolate transverse groove at the base of the scutellum, and in front of it a line of white hair; median segment opaque with a few very short striæ at the base; a longitudinal carina lying in a shallow sulcus, extending to the end of the segment dorsally; the posterior truncation with thin white pubescence. Abdomen shining, microscopically punctured, the apical segments clothed with thin pale pubescence; the pygidial area triangular, with coarser punctures and short golden hair; second recurrent nervure received at rather more than one-third from the apex of the second submarginal cell, the first received a little further from the base of the first transverse cubital nervure.

Black, base of mandibles whitish; clypeus whitish in the centre, dusky at base and sides, scape dull yellowish-white; flagellum (somewhat darkened apically), entire abdomen, apex of femora, tibiæ, and tarsi ferruginous, the anterior tarsi paler; tegulæ and nervures fuscous.

Male. Length slightly over 6 mm. Clypeus black, apically porrect, armed with a stout spine; there is a short prominent keel above the antennæ; face clothed with short silver pubescence; hypopygium triangular, terminating in a spine, with a spine on either side near the apex. Scape darkly pallid at end.

Hab.—Brisbane (*Hacker*), February, March. On flowers of *Lomatia silaifolia*.

ZOYPHIUM AFFINE, new species.

Female. Length 6 mm. Clypeus transverse, rather narrow, the apical margin with two minute teeth on each side; the posterior ocelli a little nearer to the eyes than the diameter of one; face about two-thirds as wide at the vertex as at the clypeus, clothed with short silver pubescence, which also covers the front up to level of ocelli; mesonotum and scutellum subopaque, finely punctured; a deep transverse groove at the base of the scutellum; median segment with a central longitudinal carina lying in a shallow sulcus; area diagonally striated, the striae most distinct on basal line and on the sides of sulcus; abdomen shining, microscopically punctured; pygidial area triangular, clothed with short black hair; intermediate and posterior tibiae armed with a few short spines on the outer edge; second submarginal cell pointed on the radius, receiving the second recurrent nervure two-fifths from the apex; first recurrent nervure received at about the same distance from the apex of the first submarginal cell.

Black, base of mandibles, clypeus, scape, first joint of flagellum, and the anterior coxae flavous; legs shining chrome-yellow; flagellum ferruginous; wings hyaline, iridescent, faintly dusky, nervures brown.

Male. Length 4 mm. Clypeus yellow, without teeth; face clothed with silver pubescence as in the female; hypopygium ferruginous, obtusely rounded at the apex, with an obtuse tubercle on each side.

Hab.—Brisbane (*Hacker*), February.

This species is very close structurally to *Z. crassicornis* Ckll., from which it may be separated by the silver (instead of golden) pubescence on face (golden in *crassicornis*), and the bright yellow clypeus in both sexes (pale ferruginous and dusky in *crassicornis*). It is also related to *Z. doddi* Turner.

ZOYPHIUM FUSCIPENNE, new species.

Female. Length about 7 mm. Closely related to *Z. iridipenne* Turner for which it was at first mistaken, but larger, and evidently distinct by the dusky, pale brown wings, those of *iridipenne* being clear. The stigma is dark-brown, while the nervures are pale-brown, not black. The second recurrent nervure is received at more than three-quarters from base of second submarginal cell. In other respects the insect agrees with Turner's description of *iridipenne*, but it should be stated that the abdomen is dusky red at apex, and the flagellum is brown beneath. The silvery hair on face and lower part of front is thin and not brilliant, its outline on the front is in the form of a very broad V.

Hab.—Wedge Island, Tasmania, 4-1-1914 (*G. H. Hardy*).

SUBFAMILY ARPACTINÆ.

ARPACTUS CRUCIGERA, new species.

Female. Length 9 mm. Head, thorax, and abdomen finely and closely punctured; eyes not convergent towards the clypeus; posterior ocelli a little further from each other than from the eyes; front and sides of face clothed with

short golden hair: clypeus transverse, shallowly emarginate at the base, more sparsely punctured than the rest of the head, a transverse sulcus at the base of the scutellum coarsely longitudinally striated; scutellum large, oblong, the basal and apical sides parallel, finely punctured except a small bare part in the centre; basal area of median segment with coarse longitudinal striæ, which are slightly deflected at the boundary, but continue over the dorsal surface; sides of median segment with longitudinal striæ. First abdominal segment narrowed at the base, slightly constricted at the apex, and rather coarsely punctured, the third, fourth, and fifth segments clothed with light pubescence; pygidial area triangular, shining, and sparsely punctured. Fore tarsi with short weak cilia, intermediate tibiæ with two equal apical spines, hind tibiæ with a few minute spines. First, second, and third abscissæ of the radius of equal length.

Black; the two basal joints of the antennæ, clypeus, labrum, mandibles at base, broad upper margin of prothorax, tubercles, large wedge-shaped area on pleura, and a stripe on each side on the mesonotum, yellow; scutellum yellow at sides, leaving a large black triangle in the middle; postscutellum yellow with a black triangular mark in the centre, and separated from the median segment by a black line; the basal area is yellow very distinctly outlined on the sides with a black line, a central black stripe commencing at the postscutellum passes through the basal area and continues to the end of the median segment; this stripe and the line between the postscutellum and the basal area make a conspicuous black cross; sides of median segment yellow; the apical half and sides of first abdominal segment, apical margins of the remaining segments (narrowest on the second) yellow; antennæ and pygidial area ferruginous; the outer sides of anterior and intermediate tibiæ and tarsi yellow; the inner sides and the posterior legs ferruginous. Wings brownish hyaline, the radial all brown, stigma ferruginous, nervures dilute fuscous, tegulæ testaceous.

The venation resembles that of *A. rufomixtus* Turner, but the second recurrent nervure bulges more outwardly. The basal nervure meets the nervulus.

Hab.—Brisbane (*Hacker*), November.

ARPACTUS RUFOMIXTUS Turn.

Male. Length 7 mm. The underside of the scape is yellow, the clypeus is yellow with a narrow testaceous line on the apical edge; the face below insertion of antennæ is clothed with light silky hair; other markings as in the female.

Hab.—Enoggera, near Brisbane (*Hacker*). Both sexes bred from oval cocoons which were dug out of a sandy bank. This sex has not previously been described.

The use of *Arpactus* for these insects depends on the acceptance of the "Erlangen list." For the present we follow the usage of Turner, who revised the Australian species. The other alternative, following the laws of priority, would be according to Morice and Durrant *Ceropales* Latrielle, which is current for quite a different sort of insect, but Rohwer maintains *Ceropales* in the usual sense (*J. Ac.*, Washington, vol. 10, p. 176).

JOHN GOULD'S NOTES FOR JOHN GILBERT.

The names of John Gould and John Gilbert are so closely associated with Australia that new records of their work are still of interest. Through the kindness of Mrs. Charles Coxen and Mr. H. C. Coxen, relatives of John Gould, a small bound volume of manuscript containing the instructions written by the great ornithologist for his enthusiastic collector, John Gilbert, has been given an honoured place among the historical documents in the Queensland Museum.

In clear and elegant writing the ardent wishes of the pioneer naturalist are set out. Although the notes were never intended for publication, it has been thought desirable to print them in their original condition, with a few obvious slips revised. These notes were evidently for Gilbert's use on his second visit to Australia, and were written over eighty years ago. A special and pathetic interest is attached to them because of John Gilbert's tragic death in Queensland at the hands of aborigines during the Leichhardt expedition to Port Essington in 1845. That story is too well known to need repetition, and the collector's lonely grave in the far North will always be sacred to the naturalists of Queensland.

The bracketed numbers in the text refer to a few explanatory notes which are given at the close.

NEW SOUTH WALES.

"Collect specimens of *all* kinds of kangaroos and other mammalia, with their crania; send, if possible, the nose, face, and the palms of the hands and feet of all kinds of the smaller animals in brine or spirits, and make notes of their colour, as also of the eyes with their dimensions.

"Three kinds of wallaby run in the brushes of Illawarra, viz., *Halmaturus* [1], *ualabatus*, *H. Tithys* (the common pademellan, a red-necked kind), and a nearly allied species called 'Pama' by the natives. Of this latter, which is very like *Derbyanus*, I wish as many specimens and crania as convenient, and also fine specimens, and particularly crania, of the two former.

"At Illawarra I also saw, but could not procure, a small mouse-like animal among the leaves on the hills. The *Halm. ruficollis* (Warroon of the natives) is also very abundant on the rise of the hills by the side of the bush road between Wollongong and Bongbong. This kangaroo, of which I want good specimens, and particularly a *skeleton of an adult male and crania of both sexes*, may be procured by paying a visit to Mr. Throsby, at Bongbong, who will send his Tommy or some other native out with you. Bongbong is near Berima and can be reached either by going in the mail cart from Sydney, or by walking over with native guides from Wollongong. The koala or monkey [2] is also common on this road, and in Throsby Park the grey magpie *Strepera*, which I want.

“Both the *menura* and the *tallegalla* are abundant in some parts of the Illawarra district, but they are scarce near Wollongong. . . . The nidification of *menura* [3], being of the utmost importance, you must not fail to gain every information from the natives as to the structure and situation of the nest, number of eggs, &c., &c. Offer high rewards for the eggs, but you need not spend time in trying to shoot the birds. The bell bird, *Orthonyx*, satin and catbirds, Ganggang parrot, large green pigeon (*magnifica*) *columba*, Phasianella, all breed in these brushes, and of all of which I want the eggs.

“When at Bongbong, the natives also told me of a large blue-grey kangaroo which they sometimes killed. I could never make out what it is unless it be *robustus*. Make enquiry.

“In all districts get rock kangaroos, if possible, and kangaroo rats.

“Be very particular in ascertaining if there is an emu inhabiting the brushes, of a small size and black. I saw the footsteps of an emu on the small island next Mosquito Island at the mouth of the Hunter, and from the character of the brush and the low swampy nature of the soil I should not be surprised if it prove to be the small species. The natives would probably throw some light on the subject. Baker's Island is close to Newcastle, on which lives a Mr. Baker (a gardener) and his sons; they would give you information.

“The great *Macropus laniger* [4] is also found on the plains; in all probability it might be got by getting to any of the out stations behind Port Philip. I found it both in S. Australia, near the Murray, and on the extensive plains of the lower Namoi, near Gundermein; it is also to be found still nearer the colony, both at the Peel towards New England and within twenty miles from Brezi on the river Mokai, northward of Liverpool Plains, and which could only, I think, be got from Brown's station, eighteen miles lower down the Mokai. *Robustus*, *frænatus*, and *dorsalis* are also found at Brezi, but do not go purposely for these. The great wallaroo could be procured by employing the Yarrundi natives (Coxen's). I found them on the hills in front of Mr. Coxen's house, and Natty pointed out a hill close to the cedar brush at the Liverpool Range where they are abundant. Should you visit the Upper Hunter district it would perhaps be well to spend a week in getting as many specimens of the wallaroo as possible, always securing the services of Natty and Jemmy, my faithful companions. Mr. Coxen would doubtless lend you a horse and cart and send you and your traps to the range where you would take up your quarters under the very hills on which the animal is found. The rock kangaroo, of which I should like several specimens, is also abundant here. The brushes are not worth hunting for the birds.

“You will also in this district procure the rat kangaroo [5] with the long white tip to its tail—not the common one found about Yarrundi—but if you call Natty's attention to the one we so often saw on all the low grassy hills immediately adjoining the range he will recollect. I, unfortunately, did not obtain it.

" You will, of course, collect every species of *mammal* in all the districts you visit. Pray try to get a little mouse (somewhat larger than the common European one) with a short blunt head, and which Jemmy caught for me from a hole in the ground in the bush close to Mr. Coxen's garden gate at Yarrundi. There are six or eight opossums in this district, four of which are only found in the brushes. Be sure to get the large great brush opossum with short ear [6] found in the hollows of the trees.

" Be sure to get the opossums from Illawarra and, indeed, from every district. Ascertain also if those of the plains are not distinct from those of the brushes; as I found to be the case at the Liverpool Plains.

PORT STEPHENS.

" On the hills at the back of this place, and doubtless on the ranges at Moreton Bay, the beautiful *M. Parryi* is found, and probably *robustus* and other species. . . . Gain all possible information respecting the nidification of the *Cuculidae*. Ascertain, if possible, what species lays the olive-brown eggs [7], by searching for the eggs in the body.

" Gain further information respecting the nidification and habits of *Centropus*, whether more than one species—the changes they undergo, and if the brown birds are the young, or if this style of colouring is sexual.

" Make every enquiry about *Pedionomus*; it will most probably be found on the open sterile plains of the interior of W. Australia.

" *Kangaroos from W. Australia*.—Gain every possible information respecting the group. Collect adult males and females, together with the young of every species, and, if practicable, ascertain the weight of each and the difference of the weight of the sexes. Procure also as many crania as possible, labelling each with the name of the species and the sex. Procure the wallaby from Garden and Rotnest Islands. Dissect as many females as you can and learn if the young are found in the uterus and pouch at the same time; state the size of the young in the pouch. Specimens and crania of *Gilbertii* [8] particularly wanted.

" Attend to the seals.

" For birds of Western Australia see the list; and of those marked with the greatest number of x's send as many as can be collected. Fine examples of the nests and eggs of all; and also duplicates of the eggs.

" As many fish from every part not only of New Holland, but the Cape, St. Jago, &c.

" Shells, as many as possible; see Mr. Cuming's directions.

" Of plants, some ornamental shrubs and pieces of bark for drawings.

" The beard of the *Pinna* from the Sound.

" Send all the sponges and corallines possible.

"Collect reptiles and insects.

"See after a second emu in W. Australia.

"Collect emus from every locality. Ascertain the sex and procure if possible adult birds.

"Eggs of *Leipoa* and *Megapodius* in brine or new preservative.

"Specimens and crania of all quadrupeds, great or small."

NOTES.

1. The genus *Halmaturus* is now usually incorporated with *Macropus*, although, apart from size, the persistence of the premolar in the smaller wallabies forms a useful distinction from the kangaroos (*Macropus sensu stricto*). Some of the large fossil macropods, however, have a persistent premolar. *Halmaturus* "*Tithys*"—*Macropus thetidis*. The "pama" or parma wallaby was described by Waterhouse in 1846 as *M. parma*.

2. The unsuitable term "monkey" for the koala or native bear was subsequently dropped.

3. Although Gould described from Dr. Ludwig Becker's notes the nest and habits of his *Menura victoriae*, no account of the nidification of the closely-allied New South Wales bird appeared in his books.

4. *Macropus* "*laniger*" is better known as *M. rufus*, the red kangaroo. *Onychogale frænata* is the bridled wallaby, one of the nail-tailed group.

5. *Bettongia lesueuri*.—It may be noted that Gould wrote of the rat kangaroo and the kangaroo rat, and the confusion exists to-day; but the former, meaning rat-like kangaroo, is obviously the better term.

6. "The great brush opossum" is *Trichosurus caninus*, typically found in our "scrubs" or rain-forest, whilst *T. vulpecula* is characteristic of the open forest.

7. As noted by Gould in his Handbook, I, p. 624, the bronze cuckoo, *Lamprolaima plagusius*, lays olive-brown eggs.

8. "Gilberti" evidently refers to *Potorous gilberti*, a rat kangaroo of Western Australia, named by Gould in 1841 in recognition of Gilbert's work.

It is impossible to read through these notes without feeling a touch of that enthusiasm with which John Gould inspired his able collector. The records of these two men stand out in the literature of Australian Natural History, and the writer considers it a privilege to be able to give some publicity to the interesting notes in this little volume.

HEBER A. LONGMAN.

NOTES ON THE FAT-TAILED MARSUPIAL MOUSE (*SMINTHOPSIS CRASSICAUDATA*).

BY W. B. ALEXANDER, M.A.

On 17th June, 1922, at Westwood, Central Queensland, I noticed my kitten carrying a small animal in its mouth which, when rescued, proved to be a male of this species. It was somewhat remarkable that it had been caught in the open paddock behind my house in broad daylight. Unfortunately, it had been killed before I rescued it.

A few evenings later the same kitten brought a live specimen into the sitting room and proceeded to play with it. Fortunately, I was able to rescue it before it had been injured, and, subsequently, I kept it alive in a small cage in my room for several weeks. As comparatively little seems to be on record concerning the habits of these small nocturnal marsupials, I have thought it worth while to describe the habits of this individual as far as I could observe them. Like the first specimen, it was an adult male.

The box in which I kept it was lined with rough sods of turf, and during the day it remained concealed amongst the grass. It did not attempt to burrow, but pulled down a few long pieces of grass in such a way as to construct a slight shelter over the hollow in which it slept. About dusk it came out and ran about in its box looking for food. Its progression was effected by a series of short runs, with pauses at short intervals, and it not infrequently made short leaps, springing off its hind legs. It was able to jump on to the edge of the box, a height of about six inches above the turf floor, when the cover was removed.

The cover was of wire-gauze, and when this was in place it not infrequently clambered about on it, hanging from the under surface.

At first it was completely nocturnal, but, after a time when it became tamer, it not infrequently moved about in the day-time, especially during a spell of cold weather when I was unable to find many insects for it and it was presumably hungry.

It readily devoured cockroaches, large moths, and spiders. The cockroaches and spiders were completely eaten, but the wings of the moths were left. It also greedily devoured the white grub of a scarabæid beetle, but did not touch a good-sized earthworm. When hungry it would eat a small amount of beef-fat, but evidently did not care for this diet.

When eating it sat up on its haunches holding the insect in one of its front paws and biting portions out of its victim apparently haphazard, and without first killing it.

Though it was provided with a small tin of water it was never seen to drink, and I do not think water can have been necessary to it. After it was tame I tried holding a little piece of sponge soaked in water and in milk just in front of it, but it would not drink, nor did it lick off drops of water which fell on its fur.

It cleaned its fur in the same manner as a cat, sitting up on its haunches and licking itself, licking its paws and passing them over its head and neck to clean those parts of its fur which were out of reach of its tongue.

Its ordinary call was a low chirrup, and it frequently uttered this sound in the evening when running about in its cage. It would generally make the sound from its hiding place whenever I chirped to it in the day-time. When the cat was playing with it, it uttered a much louder, shriller, chirping sound, but I am glad to say this terrified call was not heard again.

Owing to a scarcity of insects I one evening introduced into its cage a large crab-spider with a breadth of some five inches across the legs. The mouse had killed and eaten a smaller specimen of the same kind, measuring from three and a-half to four inches across, but next morning the large spider was still unharmed in the cage. I removed it and, on hunting for the mouse found it in its corner alive but shivering, the trembling being especially apparent in its tail. Next day it died, and I have little doubt that its death was caused by the poisonous bite of the spider.

I am indebted to Mr. H. A. Longman, Director of the Queensland Museum, for identifying the species.

SOUTH QUEENSLAND MARSUPIALS.

BY HEBER A. LONGMAN, F.L.S., DIRECTOR.

MACROPUS RUFICOLLIS Desm.

Although the pelts of *Macropus ruficollis* Desm. have been frequently noted by the writer during the large sales of marsupial skins in Brisbane, no specimens with definite Queensland localities were obtained until July last, when Mr. M. J. Colclough of our staff secured two males and two females at Mundubbera, Burnett District. This is the most northerly record for the species. Except for a reference in Ogilby's Catalogue* and a note by Lonnberg and Mjoberg of a skin from Tambourine Mountain†, there appear to have been no registrations of this large wallaby for Queensland.

A NEW MACROPOD.

Notwithstanding its proximity to Brisbane, Stradbroke Island in Moreton Bay has never been satisfactorily searched for its mammals. This large island, thirty-three miles in length and attaining a breadth of seven miles, has big areas which are very rarely visited. Although *Petauroides volans* and *Petaurus* sp. are reported, we have no records of other Phalangeridæ, but Mr. Roland Illidge notes‡ having seen the nest or "drey" of a ring-tailed opossum over forty years ago. Bandicoots (*Isodon macrurus*) are common. Very large specimens of the great grey kangaroo (*Macropus giganteus*) are to be occasionally seen, and a common wallaby is *M. ualabatus* of the mainland. In the early days pelt-hunters took a heavy toll, but fortunately the island was recently added to the many reserves which have been proclaimed in Queensland.

Mr. Colclough remembers seeing many years ago numbers of what was known as the Red Stradbroke Wallaby, which then frequented the open forest and grasslands of this large island, occasionally being seen also on the sea shore. Unfortunately no specimens were secured for this Museum. Through the kindness of Mr. Thomas Welsby, of Amity Point, whose writings have added much to our knowledge of Moreton Bay, we received some time ago two heads, with perfect skulls, forepaws, and a pelt of this very elusive red wallaby. Later on we hope to secure, by special permit, additional material, but as it is obvious that this marsupial presents characteristics which make it distinct from described forms, a preliminary notice is here given.

* J. Douglas Ogilby, Catal. Austr. Mamm. Austr., Mus., 1892, p. 56.

† Lonnberg and Mjoberg, Kungl. Sven. Vet. Ak. Hr., Bd. 52, 1915, p. 7.

‡ R. Illidge, Qld. Naturalist, III, No. 6, 1922, p. 109.

MACROPUS WELSBYI new species.

THE RED STRADBROKE WALLABY.

Size medium; general form robust; not slender. Colour remarkably uniform, agreeing best with the "orange-rufous" of Ridgeway's nomenclature (Plate IV. No. 13); this colour extends on the top and sides of the head to the region of the orbits, also on the sides and limbs, but is distinctly lighter on the ventral surfaces and base of tail (tail incomplete), and merges into brown on the forepaws. Fur fine and silky in texture; hairs on back fully 35 m.m. long, but with no outstanding longer hairs with special colour zones. The bases of the hairs are buff-coloured throughout. Top of muzzle grizzled. With the exception of a darker area below the eye, which merges towards the nasals into the grizzled appearance of the muzzle, there are no face-markings, and there is no indication of a white whisker stripe.

Rhinarium large and naked, the wide superior border of granulated area being almost straight, and in this respect corresponding closely with that of *ualabatus*. Ears oval, thick and muscular, 80 m.m. in length; thickly clothed externally with the uniform orange-rufous hairs; almost naked interiorly except for strong lateral tufts and a few scattered hairs.

Skull.—The type skull is from a specimen which is not fully mature. The third premolar and also m.p.⁴ (using Thomas's notation from the British Museum Catalogue) are still in place. The labial portion of p.⁴ has been exposed from the alveolus, and it is evident that this tooth is of the massive *ualabatus* type, with prominent vertical ridges, the length being 9 mm. The fourth true molar is only just beginning to emerge.

Facial axis short, 208. Premaxillæ short and upright, with the sutures only slightly oblique. Nasals parallel in region of premaxillæ, then gradually increasing in breadth to the fronto-maxillary suture; slightly emarginated in the sagittal line at the union with the frontals. No distinct postorbital processes, and no marked constriction, but supraorbital ridges prominent. Frontal region very slightly concave. Infraorbital foramina opening 9 mm. from orbit. Palatal openings oval, 11 mm. in length.

Front incisors placed vertically as in *ualabatus*; l.³ with the posterior segment slightly shorter than that anterior to the notch; p.³ oval, 7 mm. long. Measurements, basal length 110; greatest breadth 64; nasals: length 45, greatest breadth 15.5, central breadth 10; intertemporal breadth 18.5; palate length 70, breadth outside m.² (perm. teeth) 34, inside m.², 20; palatal foramina 6.5; diastema to p.m.⁴ 18; basi-cranial axis 35; basifacial axis 75; facial axis 208; Teeth, length of third incisor 7.5, length of p.⁴ (measured in alveolus) 9; length of m.¹ — m.³ (permanent molars) 22.

To facilitate comparisons, these measurements have been taken on the lines of Thomas's Catalogue.

The narrower nasals (especially in their expanded region) are an outstanding feature when this skull is compared with a series of a dozen *ualabatus*. Both the internal and the external nares are relatively smaller in the island species. The palatal openings are smaller and the anterior foramina are narrower than in *ualabatus*, but these last two features are too variable to be of much value.

In colour *Macropus welsbyi* most nearly resembles the large kangaroo *M. antilopinus*, from the Coburg Peninsula. It is quite distinct from *M. ualabatus ingrami*, described by Thomas in 1908*, and from the North Queensland *M. ualabatus apicalis*.

Apart from cranial characteristics, the presence of these very handsome red wallabies has been so often vouched for by naturalists visiting Stradbroke that it is impossible to dismiss them as examples of erythrism. But for the fact that specimens of typical *ualabatus* are also found on Stradbroke, these uniformly-coloured wallabies might be considered a well-marked island variety of the common species.

MACROPUS AGILIS Gould.

It is somewhat of a surprise to receive from Stradbroke Island a large pelt, accompanied with a skull, of *Macropus agilis* Gould. This was secured in 1918 by Mr. Frank Day and Mr. Thomas Welsby at Wallin Creek, near Amity Point, Stradbroke. The Queensland Museum has a fair series of these large wallabies, but the previous most southerly record was Fitzroy River, "40 miles from Rockhampton," where the late Kendall Broadbent obtained six specimens in 1887. (This Fitzroy River must not be confounded with the West Australian Fitzroy.)

In 1910 E. Schwarz recognised four sub-species of *M. agilis* as follows:—*M. agilis*, Gould, *sensu stricto*, Arnhem Land; *M. agilis papuanus*, Ptrs and Doria, Southern Papua; *M. agilis jardinei* De Vis., Northern Queensland; *M. agilis aurescens* Schw., W. Kimberley, West Australia.†

In 1913 E. Lonnberg described *M. agilis nigrescens* as a fifth subspecies, the locality being Broome, North-west Australia.‡

The Stradbroke pelt agrees best with the large type specimen of *Macropus jardinei*, now somewhat faded, but it is decidedly lighter and only a very few long hairs with dark tips are present. It is probable that this is due to

* Oldfield Thomas P.Z.S., 1908 p. 792.

† E. Schwarz, Ann. Mag. Nat. Hist. (8), V. 1910, pp. 164-6.

‡ E. Lonnberg, Kungl. Sv. Vet. Ak. Hgr., Bd. 52, No. 1, 1913.

summer pelage. Considerable difference can be noted in a series of twenty specimens of Queensland *agilis*, and the amount of dark colouring is most variable. The Stradbroke specimen is not so richly coloured as several of the northern examples. It represents a large male. No special characteristics can be found to differentiate the skull from those of northern specimens. A second skull, which is immature, has also been received from Stradbroke.

The following are the dimensions of the large Stradbroke skull, the corresponding figures for a Cardwell, North Queensland, specimen being given in parentheses:—Basal length 145 (142); greatest breadth 78 (81); nasals: length 66 (66); greatest breadth 22 (22); central breadth 16 (16); intertemporal constriction 16 (15); palate length 98 (100); breadth outside m.² 45 (45), inside m.² 29 (29); palatal foramina 9 (8); diastema 35 (33); basi-cranial axis 40 (38), basifacial axis 106 (107), basifacial index 265 (278); teeth, length of p⁴ 9.5 (10), length of m¹ — m³ 25.5 (26.5).

Mr. A. S. Le Souef, Director of the Zoological Gardens, Sydney, informs me in correspondence that he also has a pelt of *Macropus agilis* from Stradbroke Island.

THREE NEW QUEENSLAND FISHES.

BY J. DOUGLAS OGILBY.

FIERASFERIDÆ.

FIERASFER HOULTI sp. nov.

(Plate XIX, Fig. 1.)

HUMP-BACKED MESSMATE.

Type locality.—Off Double Island Point, South Queensland.

Body deep, the dorsal contour strongly gibbous, much more so than that of the ventral, which is but little rounded, its greatest depth, which is well behind the small pectoral, 8.5 to 9.75 in the total length and about 1.22 in the length of the head, which is depressed, snake-like, and of sinister appearance, two and one-sixth times longer than wide, about equal to its distance from the origin of the dorsal, and 7.5 to 7.75 in the total length. Snout broad and obtuse, its length 4.25 to 4.75 in that of the head. Nostrils contiguous and valvular, the anterior much nearer to the tip of the snout than to the eye, the diameter of which is 4.5 to 5 in the length of the head. Interorbital space a little less than the snout. Upper jaw the longer, the cleft of the mouth extending backwards to beyond the eye, its length 2.2 in that of the head.

Teeth on the jaws small and conical, without canines either anteriorly or on the sides of the mandibles. Vomer with four strong, close-set, caninoid teeth, situated the one behind the other, the third from the front the largest.

Dorsal fin low, its distance from the tip of the snout 3.84 in the total length; caudal very small; anal much higher and more distinctly rayed than the dorsal; pectoral small but well developed, 3.5 in the length of the head.

Gill-openings well developed; united gill-membranes leaving fully half the isthmus uncovered. Vent situated rather in advance of the middle of the pectoral-base.

Grayish-brown, dotted with darker, the dots even encroaching upon the basal half of the pectoral.

The specimens here described, two in number and presumably an adult male and female, measuring respectively 283 and 236 mm., were trawled by Captain Hoult of the State Trawler Bar-*ca-Mul*, in 36 fathoms off Double

Island Point. They were, according to his statement, when caught, enclosed in the eviscerated remains of a holothurian, and were "very vicious" when shaken out on the deck. This species differs altogether in shape from *F. homei*, the great curvature of the dorsal profile rendering it much deeper than that fish. Reg. No. I. 3444-5.

TATHICARPUS APPELI sp. nov.

(Plate XIX, Fig. 2.)

SCRIBBLED ANGLER.

Type locality.—Wide Bay, South Queensland.

Depth of body 1.75 in its length. Caudal peduncle two-sevenths deeper than long, its depth 2.7 in the length of the head. Upper profile from the tip of the snout to the origin of the second dorsal gently rounded, but with a slight notch in front of the occipital spine. Width of the head slightly more than half its length, which is 1.8 in that of the body. Snout 5.33 in the length of the head and 2.25 in that of the maxillary. Diameter of eye equal to the length of the snout; interorbital width 1.2 in the eye-diameter. Maxillary extending to below the middle of the eye, its length 2.37 in that of the head, the width of its rounded distal extremity one half of the eye-diameter. Mental tubercle small.

Cutaneous appendages in small number, simple, longest on the chin, throat, and corner of the mouth.

Rostral spine and filament extending to the fourth dorsal ray, its length subequal to that of the head; frontal spine curved, its length 2.67 in that of the rostral, extending slightly beyond the origin of the occipital spine, its membrane reaching midway; occipital spine similar to but one-third longer than the frontal, bearing anteriorly a pair of long median filaments and subterminally a similar pair, one of which is posterior, its length rather less than half of the head, extending when depressed to third ray of the second dorsal, its membrane reaching about midway along the interdorsal space. Second dorsal with eleven rays, originating above the base of the pseudobranchium, its length subequal to its distance from the tip of the snout and 1.28 in the length of the head; outer border strongly convex, the fifth and sixth rays longest, 1.3 in the basal length; the depressed rays reach to the base of the caudal. Length of caudal fin 2.33 in that of the body. Anal fin with 7 rays, originating below the seventh dorsal ray, with sharply rounded outline, the third and fourth rays equal and longest, slightly less than the highest dorsal ray, rather more than twice the basal length, and extending well beyond the base of the caudal. Pectoral fin with seven rays, reaching slightly beyond the end of the anal-base, its length 1.95 in that of the body. Third ventral ray the longest, 2.4 in the length of the head.



Fig. 1.—FIERASPER HOULTI, Ogilby.

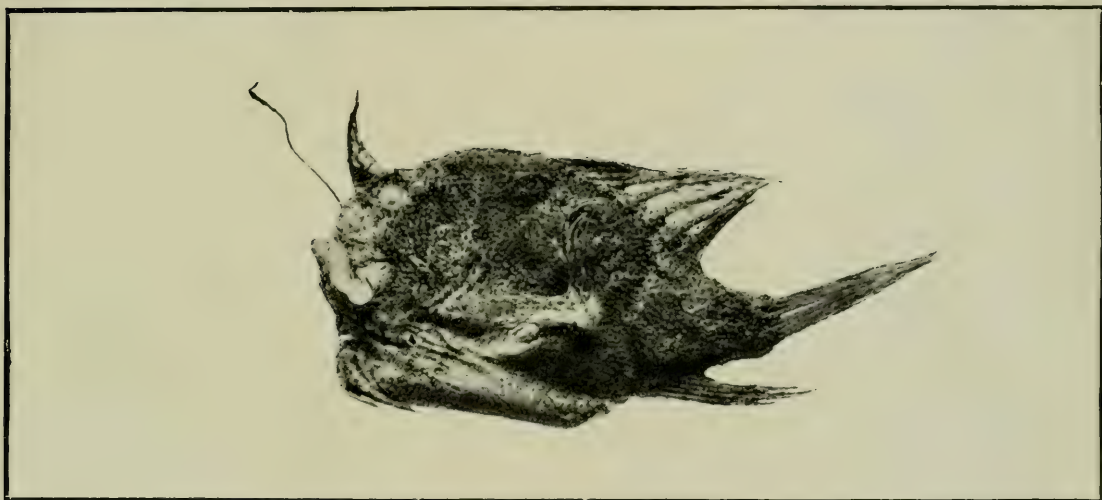


Fig. 2.—TATHICARPUS APPELI, Ogilby.

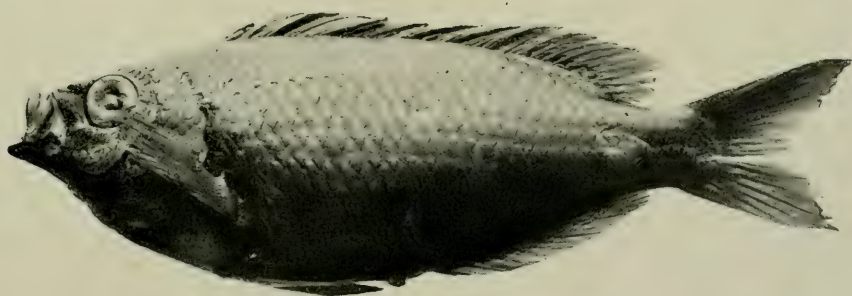


Fig. 3.—CHROMIS VIRESCENS, Ogilby.

Upper surface and sides pale brown, lower surface plumbeous, the whole densely spotted and streaked with black. Chin and maxillary grey, the former black dotted. Rostral spine and tentacle with alternating rings of black and white, the latter much the wider in the spinous portion; frontal and occipital spines and filaments blackish, the membranes hyaline; rays of soft dorsal pale brown, the membranes hyaline sparsely spotted with brown. Caudal similar to soft dorsal, the outer ray above and below with alternate lighter and darker rings. Anal rays blackish, the membranes hyaline, blotched and spotted with black. Upper edge of pseudobranchium like the sides, lower edge grey. Pectoral and ventral lavender, sparsely black-dotted.

Known only from the type, which measures 81 mm., and was presented to the Queensland Museum by Mr. F. G. M. Appel, who obtained it in Wide Bay. Reg. No. I. 3183.

POMACENTRIDÆ.

CHROMIS VIRESCENS sp. nov.

(Plate XIX, Fig. 3.)

GREEN PULLER.

Type locality.—Hervey Bay, South Queensland.

Body slender, its width 1·84 in its depth, which is 2·67 in its length and one-fourth more than the length of the head, the ventral contour more arched than the dorsal. Caudal peduncle a little longer than deep, its least depth 2·5 in the length of the head. Head about four-ninths deeper than wide, its fronto-occipital profile linear and but little acclivous, merging almost insensibly into the nuchal convexity, its width 1·22 in its length, which is 3·6 in that of the body. Snout pointed, 1·3 in the eye-diameter and 3·8 in the length of the head. Diameter of eye 2·85 in the same. Preorbital narrow, its width 2·5 in the eye diameter. Interorbital region moderate and convex, its width equal to or a little more than the eye. Nostril round, nearer to the eye than to the tip of the snout. Cleft of mouth subvertical, the angle not reaching lower border of the eye. Maxillary extending to below the nostril, its length 3·44 in that of the head. Preopercle rough but not serrated, the hinder border directed upwards and backwards; opercle with a single spine.

Teeth in the jaws short, blunt, and conical, in several series anteriorly, the outer row somewhat enlarged.

Scales along the middle of the body, from the opercle to the root of the caudal, 30; number of tubes on the lateral line 20 or 21; four scales on the cheek below the eye. Accessory scale of ventral long, 3·9 in the length of the head.

Dorsal with xiii. 13 rays, the spines of moderate strength, originating above the base of the pectoral, the last spine about one-third shorter than the longest, which is the fourth and 1.86 in the length of the head: soft dorsal low and rounded, the middle rays the longest, but little longer than the fourth spine, its length 1.83 in that of the body. Caudal forked, with 15 principal rays, 13 of which are divided, the middle rays 1.85 in the upper lobe, which is 3.4 in the length of the body. Anal with ii. 13 rays, the second spine the longest, one-third of the length of the head and 1.25 in the longest ray; length of anal about equal to that of the head. Pectoral pointed, with 16 rays, the length 1.37 in that of the head. Ventral spine about five-eighths of the first ray which is as long as the pectoral.

Gill-rakers 17 on the lower branch of the anterior arch, the longest half of the eye-diameter.

Dark-greenish, shading to slightly lighter below; a small round black spot at the axil.

Four examples of this fish were caught in Hervey Bay by the State Trawler, and sent to the Museum by Captain Hoult. They differ from the Southern *C. hypsilepis* in the more slender habit, the shape of the soft dorsal and anal, the presence of a small axillary spot, and the absence of a whitish spot on the peduncle. The illustration, I. 3477, is of the natural size.

[END OF VOL. VII, MEMOIRS OF THE QUEENSLAND MUSEUM.]

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VOL. VII, PART I.

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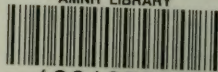
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